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ECONOMIC AFFAIRS

No. 316

ENERGY: STATUS AND DEVELOPMENT --XIV

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NATIONAL POLICY

NATIONAL GOAL OF QUADRUPLING OUTPUT HINGES ON ENERGY AVAILABILITY

HK111253 Beijing RENMIN RIBAO in Chinese 28 Dec 82 p 5

[Article by Luo Jingbai [5012 0513 2672]: "Progress in Science and Technology and the Quadrupling of Output Value"]

[Excerpt] In his report to the 12th Party Congress, Comrade Hu Yaobang put forth to the whole party and the whole people the strategic objective, priorities and steps of the economic construction in the next 20 years. In the course of study, what everybody was most concerned with and discussed most enthusiastically was the question of whether or not we can quadruple the total output value of industry and agriculture and how to do so. Following the previous habit of drawing up plans, some comrades make a simple calculation in accordance with existing technical and economic targets and therefore fail to see the grounds and prospects of achieving the objective of quadrupling output value. In his speech delivered at a national science and technology awards conference, with valid reasons and a dialectical analysis, Comrade Zhao Ziyang advanced the guiding ideology of relying on scientific and technical progress in achieving the objective of quadrupling output value on the condition of doubling energy output. The speech has not only solved a strategic problem of rejuvenating the economy but also opened up people's thinking and all the more heightened and fired the confidence of the whole party and the whole people in accomplishing the party's strategic objective.

Energy Is the Most Important Material Base for Realizing the Objective of Quadrupling Output Value

Energy is a basic condition for the production and livelihood of mankind. Since the time of boring wood to make fire, with the progress of society, man's energy consumption has all along been increasing. However, under conditions of small production and the natural economy, the people used renewable energies, such as firewood, wind energy and water energy. At the early and middle phases of industrialization, the consumption of such fossil energies as coal and petroleum was not heavy. The contradiction between energy supply and demand was not pronounced. The gorwth of modern industry and agriculture, the development of communications and transportation and the improvement of the level of various energies for daily use facilitated the rapid increase of energy consumption, thus resulting in a

gradual understanding of the importance of energy. After World War II, the capitalist economy developed at top speed for quite some period of time thanks to the low-priced petroleum it obtained. The embargo on and the raising of the price of petroleum by the Middle East oil-producing countries seriously hit the capitalist economy which was dependent on the exploitative cheap energy and caused a big decrease in its growth rate. We can thus still more see that energy shortage is bound to restrict the development of the modern economy.

In the 30-odd years since the founding of the PRC, the rate of development of China's energy industry cannot be considered slow. Laying one-sided stress on giving priority to the development of materials industry, such as iron and steel and on the processing industry, such as machine building which consume vast amounts of energy has caused serious disproportions between energy production and the energy-consuming industries. According to the 1978 statistics, at that time 20 percent of production capacity could not come into play owing to lack of energy. Strained supply of energy has obviously become a restrictive factor of the development of our economy and an important reason for the necessity to readjust the economy.

Since energy is so important, can China's energy resources guarantee the needs for quadrupling output value? China is abundant in energy resources. China has rich coal resources with its overall reserves totalling 5,000 billion tons (ranking second in the world) and its calculable reserves 1,400 billion tons (ranking third in the world). Of this, the proven reserves which can soon be mined total 40 billion tons which can ensure the needs of the exploitation within 20 years. China has about 400 million KW of exploitable hydroelectric resources which rank first in the world. The exploited and utilized hydroelectric resources constitute no more than 4 percent (in developed countries the figure is generally 40 to 50 percent). China has over 60 billion tons of petroleum geological reserves which demand our prompt prospecting and exploitation. China also has sufficient natural resource conditions for developing atomic power stations. In sum, our energy resources can entirely guarantee the needs for quadrupling the annual gross value of industrial and agricultural production. Being self-sufficient in energy will help most significantly guarantee China's economic construction against the influence of the unstable world economy and guarantee that China can self-reliantly carry out its construction in accordance with planning.

However, China's energy resources and their relevant distribution have certain characteristics. We must take a road of vigorously developing coal and waterpower resources rather than following the energy pattern of the Western countries which gives priority to petroleum. China's distribution of energy resources is uneven. Coal is mainly concentrated in the northwest regions of the country, such as Shanxi Province and Nei Monggol, while waterpower resources are mainly concentrated in the southwest. The eastern regions which consume large amounts of energy and are economically developed have limited energy resources. The heavy task of sending coal from the west to the east and that of sending coal from the north to the south requires us to strengthen the construction of communications and transportation facilities while exploiting coal resources. The great task of sending

electricity from the west to the east requires us to find good solutions to such problems as long-distance power transmission and the readjustment of the distribution of the energy-consuming industries while building large-sized hydropower stations in southwest China. To ease the tasks of transportation, we must accelerate the development of nuclear power stations in the energy-deficient regions, such as east China, Guangdong Province and northeast China. In order to increase the output of petroleum, we must speed up the prospecting of natural resources by means of advanced technology. They are all major backbone projects which require huge investments and sophisticated technology with rather long production cycles and which constitute the major measures of strategic significance which have a bearing on the overall situation of economic development. We must determine to surmount difficulties, and concentrate needed funds, material resources and manpower on key development projects by stages and in batches. To do a good job in the above-mentioned key development projects, we must effectively mobilize and organize the technical forces of all sides concerned, make a good job of drawing up plans, accomplish preparatory work of all kinds as soon as possible and tackle key problems in scientific research. Devoting more money and greater efforts to scientific research and design can reduce pomgiagkone work and waste in the construction of projects and yield better economic results. We would rather run risk in scientific research than in production and construction.

If We Double Energy Output, How Do We Quadruple the Total Output Value of Industry and Agriculture?

In accordance with our financial and material resources, the scope of energy exploitation at present cannot be too wide. By the end of this century, we can only manage to roughly double our energy supply. Can the quadrupling of the total output value of industry and agriculture be guaranteed by doubled energy output? China's total output value created by per-ton of standard coal of energy consumed is only 1/4 of that of Japan and 1/2 of that of the United States. Provided our science and technology can universally reach the levels of the 1970's and early 80's of the developed countries by the year 2000, we entirely have the ability to surpass the United States in terms of the utilization rate of energy. The various countries in the world including our country are going in for the study of energy conservation techniques. It is estimated that in the 1980's and there will be some reliable and useful achievements available for application in this respect. In a word, we have great potential in energy conservation. So long as we rely on our progress in science and technology and constantly improve our managerial skills, we will be able to strive for the realization of the objective of quadrupling the total output value of industry and agriculture on the basis of doubling energy output.

How do we use our limited energy resources to increase output value as far as possible?

1. Carrying out technical transformation is the main avenue to effect energy conservation and boost output value. Over the last 2 years, we have achieved great successes in energy conservation work. This indicates that so long as we attach ideological importance to energy conservation and

pay particularly close attention to it, we will be bound to make headway in this respect. However, we must also notice that after common waste in management and production is put to an end, the further we advance, the more difficult energy conservation will be. Only when we depend on scientific and technical advance and on technical transformation, can we create a new situation in energy conservation. For example, the various fans and blowers and water pumps we use in industrial and agricultural production are mostly products of the 1950's which consume about 28 percent of the national total generation in a year. Replacing them by new products highly efficient in saving energy can reduce power consumption by a big margin. The Shenyang water pump plant, which Comrade Zhao Ziyang mentioned in his report, produced more than 1,000 highly-efficient and energy-saving water pumps of various types in the last 2 years, thus saving more than 300 million KWH of electricity and cutting down expenses by more than 18 million yuan. Again for example, spreading the use of carbon monoxide as a combustion-supporting agent in catalytic cracking refinery devices in the petroleum industry alone can create 70 or 80 million yuan of value in a year. It can thus be seen that the potential for economizing on energy and boosting output value through technical transformation is still enormous.

2. Comprehensively utilizing such energy materials as petroleum and coal can increase output value by a big margin. At present the proportion of the finished petroleum products refined and processed from the 100 million tons of petroleum which China produces each year is not large and the petrochemicals derived from this amount of petroleum are even smaller in quantity; and 400 million tons of petroleum are directly burnt in a year. The waste is absolutely enormous. In accordance with the initial conclusions from the research of specialists, raising the levels of processing and comprehensive utilization of the refinery industry and the petrochemical industry can increase by over 10 billion yuan each year. Of course, what we have mentioned above is based on our existing industrial foundation and technical level. According to the 1978 statistical data of the United States, the output value of the basic petrochemical products processed from petroleum and natural gas as raw materials could increase by 1,000 percent, and that of their end products (such as chemical fiber textiles and plastics) could increase by 10,000 percent. Therefore, the year 2000, if the annually produced 200 million tons of petroleum are fully and comprehensively utilized in accordance with the technical levels of the end of the 1970's, the output value of the derived end products will be more than 100 billion yuan. Similarly, washing raw coal and fluidizing some of it can not only produce fuels but also retrieve many chemicals. The power stations throughout the country at present consume more than 100 million tons of coal in a year. If most of this amount of coal is utilized comprehensively into electric power and heat supply, one ton of coal can yield the economic results of two tons of coal. By the year 2000, if we produce 1.2 billion tons of coal each year, will the output value of the end products derived from this sum of coal not be impressive? Here we can all the more see that the exploitation of energy resources occupies a decisive position in the development of the whole economy.

3. Attention should be paid to developing the new rising industries, light industry and handicraft areas which consume less energy but produce high output value. The level of energy consumption of China's heavy industry at present is on average 400 percent higher than that of light industry. While ensuring the balance needed in expanding the reproduction of light and heavy industries, we must further appropriately readjust the proportions between light and heavy industry and use the saved energy more in developing light industry so as to increase output value. The new rising industrial departments, such as the new materials, electronics and information industries are key departments which not only promote technical progress but also consume less energy and fewer raw materials but produce big output value. For example, the price of silicon, the raw material for large-scale integrated circuits, is almost the same as the price of pig iron of the same weight, but the price of the highly integrated products processed by the electronics industry is dearer than the price of the platinum of the same weight. Again for example, software is a new rising industry following the increasingly wide use of computers. The proportion of the expenses of software in the overall expenses of the computer system increased from 20 percent at its early stage to 80 percent in 1980, and it is estimated to rise to 90 percent in 1985. The annual output value of the software industry of the United States has reached $12 billion, ranking ninth in its national economy. We must attach importance to the development of software production, which is not only a necessity for spreading new electronic computer techniques but itself also a highly knowledge- and labor-intensive trade which yields high output value. Chinese scientists have certain strong points in the techniques for developing software and we can therefore export our software to earn additional income for the state. According to the statistics of the developed countries, the output value of the above-mentioned new rising industrial departments generally constitutes 1/3 of the total output value. The proportion of the output value of these departments of our country in the national total output value is still fairly meager. So long as we pay attention to their development, we have the possibility of increasing output value scores and even hundreds of times.

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EXPERTS OFFER VIEWS ON NATION'S ENERGY DEVELOPMENT STRATEGY

[Text] Editor's Note: Energy is the key problem in China's efforts to quadruple the total production value of industry and agriculture by the year 2000. Our nation's energy resources are abundant.

Hastening the development and the effective utilization of our energy resources, establishing correct energy principles and policies, fully relying on the progress in science and technology to stimulate the development of resources, to conserve the flow, to enhance the road of developing energy to suit the needs in economic development constitute a strategic problem. Today, this paper is publishing views and suggestions by several dozen energy experts and concerned comrades on the problem of energy development in the hope that a correct path can be explored in this regard.

Defining Key Policies To Assure Supply of Energy

Beijing GUANGMING RIBAO in Chinese, 24 Dec 82 p 3

[Article by Lin Hanxiong [2651 3352 7160], Zhu Yajie [2612 0068 2638], Gu Jian [7357 1017], and Wang Qingyi [3769 1987 0001]: "On the Strategic Problem of Developing Our Nation's Energy"]

To basically solve China's energy problem and guarantee the realization of the strategic goal of quadrupling the total production value of industry and agriculture, the establishment of scientific energy policies is an urgent task. This article will present some views on the strategy to develop our nation's energy.

Based on our unique situation, the general goal of our energy strategy up to the year 2000 should be: to strive towards satisfying the need for energy in economic growth and in the steady improvement of the people's living standard; to shape an energy system that allows various types of energy to develop in coordination, that is rationally distributed, that has a relatively high production rate and a high efficiency of utilization, that can provide energy for urban life and that can improve the environment; to preliminarily solve the

rural energy problem, and to basically stop the deterioration of the ecological environment caused by the serious shortage of energy for living in the countryside throughout the nation.

After summarizing historical experience and analyzing future trends, the following important guiding thoughts on energy are worth noting.

Broadening Sources of Income, Reducing Expenditures

Our energy problems, basically speaking, first involve insufficient supply. While the per capita average energy consumption level is very low, the wasting of energy is very serious. The efficiency of utilization is low and the potential for conserving energy is very great. Of course, we must also see that the low efficinecy energy utilization in our nation has a cause-and-effect relationship to the low economic level, low technical level and low cultural and educational level. Thoroughly changing this situation is a long-term process. In recent years, the amount of energy conserved and unused was realized mostly by relying on readjusting the economic structure, strengthening management and by forced reduction of a part of energy consumption. Dependence on this method has its limits. When a definite limit has been reached, energy conservation will mainly have to rely on technical improvement and renovation of equipment. By that time, it will be more difficult. Therefore, in the long-range view, we must not only place the development of energy at the foremost position, we must also pay a lot of attention to energy conservation.

Increasing Investment in Energy

This is the key that determines the rate of economic growth. A feasible way is to open up more channels for funds, encourage local funds to be used in energy buildup, and actively utilize foreign capital. We must accurately set the ratio of investment, and maintain a balance between sectors. In energy buildup, the best should be selected for investment. We should try to shorten the construction period and improve investment results.

Establishing a Mutually Coordinated Energy Structure

According to the conditions of our nation's resources, the technical level and economic development, we should determine the appropriate position of each type of energy and their mutual relationship, and we should maintain relative stability among them. This is an important subject matter of a scientific energy policy. Within this century, coal will still be our nation's major energy energy source. We must implement policies suited to the availability of capital, manpower, transportation and to environmental protection. Petroleum and natural gas have many uses. We must strengthen prospecting and development while solving the problem of rational utilization. In electric power buildup, we should develop hydroelectric power in a major way, develop thermoelectric power plants at mines, and build nuclear power stations in areas with a serious energy shortage. For energy in rural areas, we should carry out the policy of suiting measures to local conditions, use many mutually supplementary forms of energy, practice comprehensive utilization, and seek practical results. The development, role and application of new energy should be included in state plans geared to long-range development.

Taking Note of the Manpower Problem in Energy Industries

China's energy industry is technologically backward. It utilizes too much manpower. The wages of workers are low, and it has already become difficult to hire workers and attract students. Therefore, the development of mechanized production and improvement of safety conditions are urgently needed. We must also provide wages and welfare benefits higher than the average level of the industrial sectors to workers in the energy industry while strengthening propaganda and education.

Heavily Emphasize the Problems of Rural Energy

Ninety percent of the fuel for living used by our nation's 800 million peasants comes from firewood and stalks. According to minimum requirements, there is a shortage of over one-fifth. Forests have been overly felled. Stalks cannot be returned to the fields, and these are the major reasons for the intensification of the deterioration of the ecological environment. The unseen influences affect the entire nation and this should not be neglected.

Guaranteeing the Rational Need for Energy for Living

The level of energy consumption of the third industry and of residents in our towns and villages is too low. The per capita annual average amount of electricity used for living by urban residents is only 12 kilowatt-hours, and in the rural areas, 43 percent of the production teams do not have electricity. Fuel for civilian use consists mainly of coal, firewood and stalks. The technique of utilization is backward and environmental pollution is serious. This has an unfavorable impact upon economic development. As the population increases and the living standards rise, the demand for energy for civilian use will surely increase by a large scale, and we should exert all efforts to satisfy the reasonable need for energy for living by urban and village residents, especially guaranteeing electric power for lighting in cities.

Strengthening Energy Science and Technology and Education in a Major Way

The shortage of energy in our nation will exist for a long time. The only way out is progress in science and technology and the development of intellectual resources. Today, we urgently need to increase funds for scientific research and education in energy, reform the scientific research system for studying energy, strengthen organization, cooperation, and joint efforts to overcome difficulties, take hastening the development and conservation of ordinary energy as key points, and study new technology, new technological processes, and new materials suitable to the situation in our nation. Talent is the foundation for creating business. Higher educational institutions in the energy sector should enlarge enrollment and admission, and establish more major fields of study. Students of the system of academies of geology, coal science, petroleum, hydroelectricity, nuclear energy should all be given larger scholarships.

To realize the goal of quadrupling the output of energy, we should strategically divide efforts into several stages. Before 1985, we should conscientiously conserve energy and concretely strengthen various preliminary tasks, exert efforts to expand the scale of construction of coal, hydroelectric power and energy

transport, hasten prospecting for oil and gas resources, and begin building nuclear power stations. The period from 1986 to 1990 is the key period of energy buildup. We should develop energy construction on a large scale and on an overall basis, including coal, hydroelectricity, new oil and gas fields, rural energy and energy transportation, carry out technical improvements and energy conservation in the industries in a key way, readjust energy prices on an overall basis, and reform the energy management system. In the 1990's we should build a number of large energy bases so that energy management and energy technology can reach a higher level and form an energy system that coordinates the many forms of energy and that has a relatively high efficiency in utilization to adapt to the needs of the high speed development of the economy.

Our nation has abundant energy resources. After 32 years of efforts, we have established an energy system that ranks third in the world. As long as we implement correct policies and decisive measures, the above goals can be realized.

Increased Coal Output Key to Guaranteeing Energy Supply

Beijing GUANGMING RIBAO in Chinese, 24 Dec 82 p 3

[Article by Wu Jing [0702 0079] and Zhang Bingchang [8022 3521 2490]: "Hastening the Development of Coal Is the Key to Guaranteeing Energy Supply"]

[Text] Coal is the major source of energy at present and during a definite period in the future in our nation. At present, it constitutes over 70 percent in the one-time energy structure. Eighty percent of the fuel power in our nation's industries depend on coal, and 65 percent of the raw materials in the chemical industry use coal. Eacy year, production and living in farm villages consume 120 million tons of coal, constituting 20 percent of the total output of coal. Coal is also the major fuel for civilian use in the cities. Each year, about 150 million tons are consumed. On the other hand, in present industrial production, for every 100,000 tons of coal used, the production value increases by an average of 100 million yuan. The state can realize a profit and tax revenue of 20,000,000 yuan, and the gross national income can increase 40,000,000 to 50,000,000 yuan. For every 10,000,000 tons of coal exported, over US$500 million in foreign exchange can be earned. It can be seen that coal plays an important role in our economic development and in the people's life.

Our coal resources are abundant, with known reserves of over 640 billion tons. Increasing the output of coal requires us to rely on expanding and rebuilding old mines on the one hand, and especially in the eastern regions that lack coal but use more coal, we must appropriately increase the intensity of development to produce more coal and to reduce the pressure on railroad transportation. But some old mines will age and must be abandoned and production will drop. Some mine shafts are limited by resources and productive geological conditions. Relying on the intensive means that the expansion of production will after all be limited. Therefore, large scale increase in output still must rely on building new mines.

Construction of coal mines requires large investment. To build an annual coal producing capability requires 150 to 200 yuan in capital [sic]. The construction period is long. Over 15 years is required to develop a large mine from prospecting and evaluation to design, construction and production. The technology is complex. In productive construction, we must constantly struggle against water, fire, gas, geothermal energy and huge ground pressure. Therefore, in constructing coal mines, we must select the best for development, and we should first build a number of large open pit mines that require a short construction period and that can produce coal quickly in regions with suitable conditions. The western region centered around Shanxi (including Nei Monggol, western Henan, Ningxia, and Shaanxi), the Jiangsu-Shandong-Anhui region, the northeast region centered around Heilongjiang, and the southwest region (Yunnan, Guizhou, and Sichuan) are all key points for constructing coal bases.

To enlarge the scale of development, we must strengthen preliminary work. We must hasten the speed of geological prospecting for coal fields in key regions to be developed, improve quality of prospecting, appropriately concentrate construction forces, use new technology, new technological processes, new equipment, and break away from the out-dated conservative design concepts.

To gather necessary construction funds, besides increasing state investment, we should encourage the use of local funds for building coal mines, develop joint operations between sectors and regions, and actively utilize foreign capital.

Finding Electricity To Quadruple Industrial, Agricultural Output Value

Beijing GUANGMING RIBAO in Chinese, 24 Dec 82 p 3

[Article by Xu Shigao [1776 1102 7559], Xu Bowen [1776 0590 2429] and Huang Jincai [7806 6855 2088]: "Where Will the Electricity To Quadruple Total Production Value of Industry and Agriculture Come From?"]

[Text] How much electricity is needed to quadruple the total annual production value of industry and agriculture? How should we develop electricity? These are questions that people are concerned about. In 1980, our nation already had power generating equipment of 60,500,000 kilowatts, and the output of electricity reached 300.6 billion kilowatt-hours, ranking sixth in the world. Based on population, the per capita average was only slightly over 300 kilowatt-hours. Among the world's more than 180 nations, we rank number 112. According to estimates, by the year 2000, the output of electricity generating equipment must increase to over 240 million kilowatts before we can adapt to the need to quadruple the total production value.

To realize this goal, we must form an electricity generating structure consisting of many types of energy. In the coming 20 years, coal, hydraulic power and nuclear energy, as resources for generating electricity, cannot "support the large structure alone," and "all of them must cross the river in the same boat and help each other." Each must fully develop its own superiority, each must suit measures to local circumstances, each must develop its own ability, and they must mutually supplement each other to develop comprehensive economic benefits. This is the law of forming a modern large power network and also a strategic measure to guarantee the supply of energy in the new situation.

Therefore, in the near term, we must develop hydroelectricity as a priority. China's hydraulic resources are abundant, but most of them are distributed in the northwest, the southwest and the south central region, while our economic centers are in the east along the coastal regions where the production value of a unit amount of electricity is the highest. Therefore, we must develop hydroelectricity in the northwest, the southwest and the south central as a priority in the near future, use high-voltage power transmission to supply the coastal regions. There are no insurmountable technical difficulties. The benefit from stand-alone systems can hardly compare to that from links with the larger network.

The rural regions that lack electricity are scattered and remote. They are suitable for developing small-scale hydroelectric power. Those that can be linked to the power networks must also be mainly for self-use in the countryside, and we must appropriately handle the problem of electricity prices and economical dispatching.

Thermoelectric power still relies mainly on coal. The electric power industry must actively use advanced science and technology, and seek to lower energy consumption in development. The economic results of constructing power plants at coal pits are visible, but we must require that the development of coal and the development of electric power be closely coordinated.

Thermal power plants far away from coal mines should be fired by superior quality coal that has been washed and screened. Those utilizing poor quality coal to generate electricity must be power plants at coal pits. Their equipment should be specially designed and manufactured. In the future, the coal for power plants should gradually be supplied according to the designed types of coal so that coal can be rationally utilized and the burden on transportation and environmental pollution can be reduced.

In the future, under general conditions, we should not build more power plants fired by fuel oil. Existing power plants fired by fuel oil should be rebuilt wherever possible to convert them into plants fired by coal. for those that cannot be converted to firing coal, we must build substitute capacity coal-fired generators. We must build them first and then terminate the operation of fuel oil fired plants. We must not dismantle the plants after terminating their use. They should be kept as reserves or be used for peak regulation, or be used in capacity regulation between thermoelectricity and hydroelectricity.

Nuclear power is the only technically mature energy that can ease the shortage in the supply of mineral fuel and replace petroleum and coal on a large scale. Our nation has nuclear energy resources and also has strength in nuclear technology. We must first hasten the construction of nuclear power in East China and the northeast where energy for generating electricity is insufficient and the industrial production value is high.

To realize the strategic goal of quadrupling the production value, electric power is still insufficient. Therefore we must rely on science and technology to supplement it, develop high parameter and highly efficient large generators, build thermoelectric power plants by suiting measures to local circumstances,

and use transformer operated peak regulating generators. All of these are effective technical measures to conserve energy.

Coordinating Development of Energy, Transportation

Beijing GUANGMING RIBAO in Chinese, 24 Dec 82 p 3

[Article by Yang Hongnian [2799 3163 1628]: "The Buildup of Transportation Must Be Coordinated With the Development of Energy"]

[Text] At present, there is a severe shortage of transportation in our nation, mainly manifested in the insufficient capacity of transport coal and petroleum and such energy sources. Since founding of the nation, the development of transportation has lacked behind the development in energy. For example, the output of coal from Shanxi increased by over 40 times while the railway transportation capability in Shanxi Province increased only 6 times. Because the ratio between production and transportation of coal was not coordinated, massive amounts of stored coal could not be shipped out, and output had to be determined by transportation capabilities. To realize quadrupling the total annual production value in industry and agriculture by the end of this century and to double the output of energy, the problem of transportation must be solved.

How can the buildup of transportation and energy production develop in coordination? First, we must implement the principle of combining the buildup of energy and transportation, and we must comprehensively balance coal, electricity and transportation, and draw up the general plan. On the one hand, the arrangement for developing energy, the scale of development and the time of development must all take into consideration the conditions of transportation. On the other hand, the buildup of transportation should be taken as the key point in the buildup of transportation should be taken as the key point in the buildup of transportation. In the future, the five large open pit coal mines to be built as key state projects and the continued construction of the ten large coal bases must all be combined with the buildup of transportation.

Second, transportation buildup should use advanced technology as much as possible. We must improve transportation capability and we must also improve economic results. The amount of coal to be transported at some large coal bases as large as Shanxi is large. If we do not pay attention to improving the technical and equipment standards, if we do not improve load per kilometer of the transportation line, then the length of transportation lines that must be built will increase in direct proportion to the increase in the amount of shipping. This method of simple reliance on the extensive to complete newly added transportation capacity will not work. Therefore, the buildup of transportation must use new technology that suites the actual situation in our nation, and it must be combined with the expansion of the transportation network. And we must create a new way to improve the transportation capability and economic results, for example, building special railroads to transport coal, develop heavy load cars; develop fleets of barges for water transport; build heavy vehicles using diesel engines, etc. These are all measures suited to coal transport and that should be implemented.

Third, the various methods of transporting coal must be comprehensively developed. Coal transport not only includes railroad transport, marine transport, marine transport and highway transport, it can also be done via special pipelines.

Our marine transport has a greater potential and we should fully utilize the coastal seas, the Chang Jiang, and the large canals, and expand shipping and harbor capabilities. In developing local coal, we must emphasize highway transportation, do the work well in centralized shipment of coal, and build loading bases. We are studying pipeline transport of coal and we should also select appropriate areas to develop it according to plan.

More Equitable Price Structure for Petroleum Products Urged

Beijing GUANGMING RIBAO in Chinese, 24 Dec 82 p 3

[Article by Lan Tianfang [5663 3944 5364]: "We Must Rationally Utilize Petroleum Resources']

[Text] While hastening prospecting and development of petroleum and natural gas, we should use the 100 million tons of petroleum that is produced each year at present and fully develop its economic benefits. This is a very important task.

In using petroleum as a fuel, whether in technical possibility or in economic rationality, we should first guarantee the needs for moving equipment (airplanes, ships, automobiles). Within certain limits, it can be said that petroleum is an irreplaceable energy. As to fixed power and thermal power machinery, we should use coal or hydroelectric power as much as possible as the one-time energy.

Secondarily, petroleum is used as a raw material, mainly for the chemical industry and light industry, and indirectly as raw material for the textile industry. Some people have estimated that within this century, the output by volume of chemical and synthetic structural materials in the world will surpass that of metallic materials, and their energy consumption will be much lower than producing metals. Therefore, developing petrochemicals will raise the value of petroleum based hydrocarbons by a hundred times. In developing our nation's petrochemical industry, we must pay close attention to the sale of products and strengthen cooperation with oil refineries. We must not start from crude oil, use the method of development that requires large investment and a long construction period, that produces many intermediate products while the resources cannot be fully utilized. Even if such enterprises seem to produce huge gains, if we calculate according to international market prices, the economic results are frequently very poor.

Improving the quality and management of lubricating oils and greases is also an important aspect in energy conservation. Improving the quality of lubricating oils and greases not only can reduce the consumption of fuel oil for power, they can also conserve their own consumption. Our nation's lubricating oil products constitute 2 to 2.5 percent of the amount of crude oil processed. In

foreign nations, the percentage is only 0.9 percent to 1.3 percent. This shows that our lubricating oil products must be renovated and replaced, and management must be improved.

There is another very important class of products that people have often neglected. For example, asphalt for roads, whether in output or quality, cannot satisfy the need. Over 80 percent of our nation's highways have not been paved with asphalt. Vehicles traveling over unpaved highways will consume 10 to 20 percent more fuel than over highways paved with asphalt. Some people have estimated that using 1 ton of asphalt to pave a road will conserve 2 tons of gasoline. But because the price of asphalt is too low, it is very difficult to attract the attention of the oil refineries. Also, for example, petroleum coke is a cheap commodity for surfacing roads. A large part of it has been burned as fuel. If the technological process is changed to produce acicular petroleum coke, to manufacture high power and ultrahigh power electrodes, we can shorten the steel smelting time of the electric furnace by 56 percent and conserve 22 percent of electricity.

Rational utilization of petroleum resources cannot neglect the affects of oil prices. If oil prices are irrational, they will directly lead to a waste of petroleum. Because the state does not levy mineral resources tax on oil wells and land use fees, the cost of petroleum is too low and the price is also low. Therefore, in industry, we can regard it as a cheap fuel for firing boilers. Commune and brigade enterprises can establish indigenous oil refineries to realize high profits but this wastes resources.

Also, for example, the price of gasoline and the price of diesel oil should be similar, but the price of diesel oil is only 40 percent that of gasoline. Therefore, this leads to a big waste of diesel oil on the one hand, and on the other hand, it is unfavorable to increasing the output of diesel oil. In addition, asphalt, petroleum coke, fuel oil, liquefied gas and such products have also been wasted because of inappropraite prices.

A summary of the above shows that the use of petroleum as an energy source and as raw material is a complex problem of the economic model, it requires special study to quantitatively discover the inner relationships between them for optimization. Otherwise, examining one link in isolation from the whole situation will easily create mistakes in making decisions.

9296
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PLAN FOR SYSTEMATIC GROWTH OF RURAL ELECTRIFICATION PRESENTED

Beijing DIANLI JISHU [ELECTRIC POWER] in Chinese No 12, 5 Dec 82 pp 75-78

[Article by Fang Xinlin [2455 1800 2651]: "Rural Electrification"]

[Text] I. The Importance of Rural Electric Power Supply

Rural electric power supply is an important guarantee to realize agricultural modernization. It is a great undertaking that will bring immediate benefit to some 800 million peasants.

Today, China's agricultural consumption of electricity ranks third, following that of metallurgy and the chemical industry, and its rate of growth is the most rapid. Therefore, developing the rural supply of electricity, strengthening technical management of electricity for agriculture, improving the economic nature of the supply of electricity to rural areas all have an important impact on the entire electric power business.

II. Present Situation in Domestic Rural Power Supply

In the 32 years since the founding of the nation, the supply of electricity to our farm villages has grown tremendously. In 1980, agricultural consumption of electricity constituted 14.7 percent of the total amount of electricity consumed nationally. As the rural policies are implemented and as the rural economy improves, the supply and use of electricity will surely continue to grow on a large scale.

The supply of electricity to our nation's rural villages relies mainly on state subsidies, private local funds, and funds collected from the masses and mass labor, and it has gradually developed from being used for drainage and irrigation. Practice proves that this principle of joint effort to develop electric power by mobilizing the enthusiasm of all sectors suits the actual situation in our rural villages and benefits the growth of electric power for agriculture.

The supply of electricity to our rural villages includes the supply of electricity by large power networks and by rural power networks (stations) together. Large power networks are the main suppliers. Individual small power plants (networks) supply 8 percent of the electricity.

There is no doubt about the rate of development in the supply of electricity to our rural villages and the important role of such supply. But over half of China's peasants still do not have electricity. The quality of existing equipment to supply electricity for agricultural use is poor, and the equipment itself is unsuited to the special conditions for supplying electricity for agricultural use. The structure of the rural power networks is irrational and a large proportion of the power lines are not up to standard. There is still no series of electrical and industrial products for use in agriculture that is specially suited for supplying electricity for agricultural use, and there are no complete technical regulations, standards, or rules that reflect the technical levels of electric power for agricultural use. Technical ranks are weak and the management level is low. Therefore, there are many accidents, loss is great, construction and operating costs are high, and the incidence of death and injury from electrocution is serious. The task facing us of rural electrification technology is a critical one requiring urgent solution.

In the utilization of scattered energy sources to generate electricity in the countryside, the technology of small hydroelectric power and small thermal electric power is more mature and they have been developed and utilized more. Small thermoelectric power played a considerable part in the early development of rural electrification and will continue to play a role in some areas in the future. The extent of small-scale hydroelectric construction is quite large and provides a major source of power for the countryside. However, the hourly utilization rate of small-scale hydropower facilities is low, and the regulatory capability is poor. The electricity supplied is not very reliable and needs to be further improved. The utilization of other energy sources is still in an experimental and research stage.

Rural power networks are mainly distributed near cities and industrial and mining regions and in rural areas where the economy is developed. Vast mountain and pastoral areas and border regions still lack electricity entirely or have too little. It is more difficult to solve the problems of supplying electricity to rural villages in these regions, whether in the expenditure of capital and materials or in the amount of construction involved.

In recent years, the number of workers involved in rural electrification has increased very rapidly, and a considerable proportion of this number has very low technical and management standards. This is the main cause of the many problems in rural electrification.

III. The Supply of Rural Electric Power in Foreign Countries

The world's industrialized nations all emphasize electric power for agricultural use. Many nations have established "laws" favorable to the development of rural electrification. They have established different forms of rural electrification agencies, appropriated special funds, used low interest rates or interest-free loans and various ways to promote the development of rural electrification. At the same time, attention has been paid to the use of advanced technology for agricultural electric power and to projects to expand agricultural use of electricity. These have greatly improved the role and the economic benefits of electric power in agricultural production.

In the United States in 1960, almost 100 percent of the farms had electricity and in 1975, the amount of electricity for agricultural use reached 112.67 billion kilowatt-hours. Each mu of land uses 36.4 kilowatt-hours of electricity a year. The average annual growth rate of electric power for agricultural use is 3.58 percent. In 1980 in the Soviet Union, the amount of electricity for agricultural use reached 130 billion kilowatt-hours. The amount of electricity used by each agricultural worker increased from 380 kilowatt-hours in 1965 to 2,100 kilowatt-hours in 1977, an average annual growth rate of 10 percent. In 1977 in Japan, the amount of electric power for agricultural use was 35 billion kilowatt-hours, 3.6 times that in 1960. The amount of electricity used per mu averaged more than 30 kilowatt-hours. In France in 1959, 94 percent of the countryside had electricity and subsequent growth of rural electrification has also been rapid.

The power sources supplying electricity for agriculture in the several major industrial nations all underwent a course of development from the supply of electric power mainly by small power plants and small power networks to the supply of electric power mainly by large power networks. In 1953, there were 30,000 rural power plants in the Soviet Union supplying 67.2 percent of the electricity used in those areas. In 1962, there were 100,000 rural power plants supplying 49.4 percent of the electricity used in those areas. In the United States in 1930, there were 250,000 generators in rural areas. By 1960, rural power networks were supplying electricity to 50 percent of the farms and 1 million rural residents throughout the nation. Many small power plants developed in rural areas in France, Japan and other countries. Some are still operating now. They have played a considerable role in solving the problem of supplying electricity to rural areas.

At present, the following problems have been commonly emphasized by many nations in agricultural electric power technology:

1. The problem of electrification of agriculture. This is an important topic of concern for scholars of all nations. They all started from the actual situation in their own nations and clearly explained the concept of electrification, its scope and development pattern.

2. Problems of rural power networks. This includes: 1) exploring and studying the method of power supply and the voltage level; 2) technical questions to reduce loss and conserve consumption of electricity and to improve the transmission capability of the power network; 3) voltage regulation over the power network, no reactive compensation, voltage monitoring and remote control techniques; and 4) problems of laying electric cables for the power networks in farm villages.

3. Serialization of electrical equipment for agricultural use. This includes products having different technical requirements for agricultural use, such as electrical conduction materials, electrical machinery for farm use, low loss empty load transformers and combined transformers, electricity conserving and safety equipment and automatic control equipment.

4. Projects to expand agricultural use of electricity and to improve the economic benefits of rural electric power. There is widespread use of automated feeding and irrigation and electrical technology for heating, breeding, insect eradication, prevention of spoilage, disaster prevention, radiation, etc.

5. Scientific forecasting and planning for rural consumption of electricity and technical problems in rational development and utilization of dispersed energy sources in the countryside.

IV. Several Regulations Concerning Rural Power Suppiy Technology

(I) Source for Rural Supply of Electricity

1. China's territory is vast. In solving the problem of power sources in our farm villages in the future, we should continue to pay attention to the rational utilization of various types of dispersed energy sources, insist on the principles of combining the supply of electricity supplied by large power networks and by power stations (small power networks) in the countryside and combining state efforts to develop electric power and gathering private funds from the masses to develop electric power, suiting measures to local circumstances, considering actual results, using a variety of methods, and allowing the networks to supplement each other, hasten the buildup of power sources in the farm villages and satisfy rural electricity needs.

2. China is very rich in small-scale hydropower reserves. In parts of our southern regions, the rural supply of electricity relies heavily on small hydroelectric power. But the development and buildup of small hydroelectric power must be economically rational and must meet technical requirements.

There must be complete and general plans for the development of hydraulic resources of a creek, a small river and a region. There must be an order for development in stages and sections. They must be decided according to the best economic benefit and according to technical and economic proof of the balance between electric power and output at the locality; we must avoid the blind pursuit of installed capacity.

When building small hydroelectric power stations in an area supplied by large power networks, investment and cost should be comparable to the large power networks and we should uniformly consider them in the overall plans and designs for the entire regional power network.

3. At places far away from the large power networks and where it is not economical for large power networks to supply electricity, it is necessary to utilize the coal of local coal pits and appropriately build some small thermoelectric power stations. We must strengthen management of small thermoelectric power stations and use advanced equipment as much as possible, especially new technology that conserves coal and electricity. We must focus on comprehensive management so that there will be profits, not losses. We should fully develop the advantages small thermoelectric power stations that make use of scattered low thermal value coal and use them in a regulatory role when small-scale hydropower stations are between periods of abundant and scarce water supplies.

In suburban areas of cities supplied by large power networks, small thermoelectric power stations in industrial and mining regions pollute the environment and their economic benefit is doubtful. Unless there is a special need for the original small thermoelectric power stations, they should be moved to rural areas where there is coal and a shortage of electric power.

4. In border mountain regions, isolated villages and animal husbandry farms, slaughtering and meat processing plants, distilleries and such regions where the source of raw material for methane is reliable and where the output of methane is guaranteed, it would be useful to develop small power stations to generate power using methane as a source of electricity in rural areas.

5. Such electricity generating sources as wind power, tidal energy, geothermal energy and solar energy should be studied and utilized at places where the large power network has difficulty reaching and where such energy sources are available. The generation of electricity by wind can be appropriately popularized and used if the equipment is reliable and if the cost of generating electricity is equivalent to or lower than that of using diesel generators. We should also consider using diesel generators as a reserve power source, or consider operating small methane-fired power stations and small hydroelectric power stations together to guarantee a reliable supply of electricity.

6. The use of diesel oil (gasoline) to generate electricity is costly, it consumes precious resources, and except for temporary use in special situations, this cannot be the direction to pursue as a source of energy to generate electricity in the countryside.

(II) Rural Power Networks

All power transmission, transformer and distribution projects below 1.35 kilovolts and power networks used mainly to supply electricity to county and commune enterprises and villages are all rural power networks. Each independent local power network must join the large power network in operation as much as possible to improve the quality and economical nature of power supply.

2. Today, the load of electric power supply to the countryside is continuing to increase. Counties that use over 10,000 kilowatts of electricity should gradually form and perfect a rural power network centered around a 110-kilovolt substation. While readjusting existing power networks, we must appropriately increase the number of 35-kilovolt substations so that high voltage power lines can be extended to users as much as possible and the length of low voltage power lines should be reduced. Generally, the power supply radius of 10 kilovolts should be held to within 6 to 15 kilometers. Under special situations, this should not surpass 24 kilometers. The maximum power supply radius of a 0.4-kilovolt powerline should be less than 600 meters. Independent users with a small capacity should not be over 1 kilometer away. The voltage fluctuation at the exit of the transformer for rural power distribution should be controlled between -10 percent and +7.5 percent. The electrical voltage drop in power during accidents and in emergencies should not be lower than 15 percent of the specified voltage.

3. In the rural power networks, there are still 300,000 kilometers of power supply lines of the 10-kilovolt "two lines for one locality" system. Because the level to rural consumption of electricity continues to increase, lines of "two lines for one locality" must be reorganized. The principle should be as follows: We should not use the "two lines for one locality" system to supply electricity to industrial and mining regions, suburban areas and areas surrounding military installations. Existing lines must be quickly upgraded. The 35-kilovolt lines and the 10-kilovolt lines from 11-kilovolt substations should not use the "two lines for one locality" system. In mountain regions, grazing regions and remote village areas where electric power consumption is small and at places without important communications facilities, we can temporarily use that method of power supply and leave room for [future] development and upgrading. But the capacities of substations and transformers should not surpass 2x3,200 kilovolt-amperes; the capacity of the single units should not surpass 5,600 kilovolt-amperes.

All lines of the "two lines for one locality" that need to be upgraded but cannot be because conditions do not permit it at the present time, must be technically upgraded by insulation; protective facilities must be added, grounding equipment must be improved, line monitoring and preventive tests must be intensified, the accident rate must be reduced, and interference of communications lines must be prevented.

Actively exploring ways to establish the power supply of rural power networks and rational grading of voltage are very important. In the future, we must encourage efforts in these regards.

4. The percentage of line loss is an important indicator of the management level and the technical level of a power network. Today, China's 10-kilovolt rural power networks are the major links in our power networks with a large line loss. In the future, we must concentrate on the scientific management of line loss of rural power networks, begin theoretical computations of line loss on an overall basis, understand clearly the composition of line loss, find the weak links, and actively implement various types of effective loss reduction measures.

To reflect the actual situation of line loss of rural power networks, future calculation of line loss must uniformly use actual figures of the amounts of electricity purchased and sold. We must not use the method of calculating line loss by converting electricity fees into kilowatt-hours.

The determination of the indices of the rate of line loss must be based on theory and practice so that the planned indices for this loss can coincide with the actual situation. We must take the relative percentage of the difference between the planned value of line loss and the statistical value as the basis for evaluating line loss.

Rural power networks must carry out no reactive compensation. No reactive compensation must adhere to the principle of combining dispersed and concentrated electric power and mainly use dispersed power as compensation. We

must take the overall economic benefit realized in the supply and consumption of electricity as the prerequisite condition to determine the compensatory capacitance.

5. The technical standards of rural substations have not been appropriately determined. But compared to industrial substations, the technical standards of substations that do not have a large capacity and that supply mainly agricultural loads and rural substati s with relatively large variations in load within a short period and temporary rural substations can be appropriately lowered. Makeshift substations can be conditionally popularized and used in the countryside as long as the performance of the equipment is stable. The principle is that when a point in a power network breaks down, preventive measures should go into effect to prevent jumping levels and jumping switches. At the same time, the design of makeshift substations must leave some leeway for future development and improvement.

Rural substations that have favorable conditions must gradually use simple automatic control devices. We must gradually develop towards unmanned shifts.

The distribution of rural substations must be technically consistent with the technical requirements of the 10-kilovolt line power supply radius. Substations should not have too many output lines. Generally, they should be controlled at below six circuits, otherwise, we should consider additional substations.

(III) Electricity and Electrical Equipment for Rural Use

1. Agricultural electric power departments must be concerned about and emphasize technological development in electric power for agricultural use. They should promptly survey and study the pattern of development of the load in the countryside, make scientific forecasts, and guarantee rural needs for electric power.

To ease the contradiction in the large seasonal variation in the rural use of electricity, we must pay attention to the development of electricity for living, electricity for use by commune and brigade enterprises, and electricity for use by new projects to improve the basic conditions of agricultural production. We must promptly study and satisfy the different demands made upon power supply technology by rural electric power. To promote the development of techniques for other seasonal or temporary use of electricity in the countryside, the price of electricity can be discounted. But the price of electricity used by commune and brigade enterprises should be the same for loads of similar industries.

2. To guarantee safe use of electricity in the countryside, newly built power networks or additional equipment for electricity consumption in the future must include installations to guarantee safety, and underground cables wrapped in plastic for use in agriculture should be popularized.

3. Investment in the construction of rural power systems and material consumption are all huge. We must implement technical measures, reduce unit

investment in building up agricultural electricity and accelerate the buildup of agricultural electricity.

4. We must establish technical standards for products to generate agricultural electricity, develop a series of special products for agricultural electricity and guarantee the technical requirements for agricultural electricity.

Manufacturing departments must study and determine a rational loss ratio of copper and iron, design and manufacture transformers for rural use according to the characteristics of villages which have a low load rate and where the number of hours of utilization of power distributors and transformers is small, and on the basis of the principle of optimizing economic results so that loss of electric power over the rural power networks can be reduced effectively.

(IV) Technical Management

1. A technical inspection and acceptance system must be implemented for agricultural electricity projects. The technical departments of the province, prefecture (including regional network bureaus), and county electric power bureaus should conduct overall delivery tests according to the capacity of the equipment and importance of the rural power stations and the power transmission and conversion project. Only those projects that have satisfied the technical conditions are submitted to the business management departments for approval to begin production. Those not passing technical inspection are not permitted to begin production.

Management departments of rural power networks must test and inspect major electrical equipment and power lines used in the power network. Those not meeting technical requirements may not be used.

The technical management of electrical meters of the agricultural electric power system must be strengthened. We must strictly implement management and inspection systems for meters.

2. We must establish technical records, make the system for equipment maintenance, inspection and repair sound. Agricultural electric power projects must possess complete design, construction information and inspection and delivery documents. Major equipment registration cards and inspection and repair records must be properly maintained.

3. We must strictly implement regulations for the safe use of rural electricity, and have a sound accident analysis and reporting system. Safety regulations must be the main content in the technical evaluation of agricultural electric power workers. All accidents must be investigated as to their causes, responsibility must be analyzed, opinions on handling the cases must be proposed, preventive measures must be established and records and data must be kept. In particular, safety inspection teams consisting mainly of technical personnel must be organized to handle serious accidents. They must submit an accident analysis report according to the requirements described above and report the accident to related departments according to regulations.

4. Rural power stations and power supply departments must have a uniformly assigned number of technical personnel. New workers must be qualified by exam before they can officially be assigned to shifts and operations. Technical personnel and workers must be technically examined at fixed intervals. Those who are technically unqualified must be transferred to other jobs.

V. The Main Measures To Implement the Technical Policies for Agricultural Electric Power

1. The implementation of technical policies for agricultural electric power must be guaranteed by a regular organization. Problems in the management system for agricultural electric power must first be solved. Based on the characteristics of production of electric power, technical management and electric power dispatching must be centralized and unified, but business management must emphasize the economic responsibility system and consider economic results. We must combine the economic benefits realized by implementing a technical policy with the benefits of each enterprise, each shift and each individual before that policy can be smoothly implemented.

2. The implementation of technical policy requires a body of scientific and technical personnel and skilled technical workers possessing special knowledge in agricultural electric power. Besides training of existing technical teams, agricultural electric power departments at universities and colleges must be strengthened. We must train graduate students in agricultural electric power so that the agricultural electric power technical teams can be continually strengthened. Existing scientific and technical personnel must be trained in rotation within 3 years after which they should be trained in special subjects along with the popularization of new scientific and technical achievements. Electric power workers must receive education in basic knowledge and basic work training and they must be examined at regular intervals.

3. Electric power production and electrical engineering and manufacturing departments must coordinate closely. They should conduct frequent technical negotiations and academic discussions according to the characteristics of rural power supply and according to the demands upon the performance of electrical and engineering products. They should jointly establish technical standards for products used for agricultural electric power, speed up the development of products for agricultural electric power and summarization of operations, gradually expand the types of electrical products for agricultural use and the series of products, and satisfy the requirements in the technical development of agricultural electric power.

4. We must establish scientific research agencies for agricultural electric power, assign a fixed number of scientific and research personnel and use experimental equipment, and actively launch scientific research activities. We must launch academic discussion and exchange of scientific and technical information aimed at the major problems that have emerged in the technology of agricultural electric power, broadly mobilize workers engaged in agricultural electric power and scientific and technical personnel concerned with agricultural electric power to think of plans and make contributions to develop and improve the technology of agricultural electric power.

Scientific research in agricultural electric power must start out from the problems that urgently need to be solved in production technology so that scientific research achievements can develop their function in production in a timely manner. But speaking nationally, we still must appropriately establish subjects that have an important influence upon the development of technology in agricultural electric power, and carry out a longer period of systematic research, make necessary technical preparations, guarantee that science and technology of agricultural electric power will always lead the development in production.

In the future, we must strengthen scientific planning for the development of agricultural electric power to reduce the loss in the development of agricultural electric power.

Today, scientific research in agricultural electric power should begin experimental research in: 1) the development and utilization of rural energy sources; 2) technology of rural power networks; 3) electrical products and new types of electrical materials for agriculture; and 4) scientific planning for rural electric power and scientific forecasting of the development in agricultural electric power. The above projects should be implemented in groups and be gradually developed by starting out from the current situation in the availability of capital, technical strength and their role in present production.

9296
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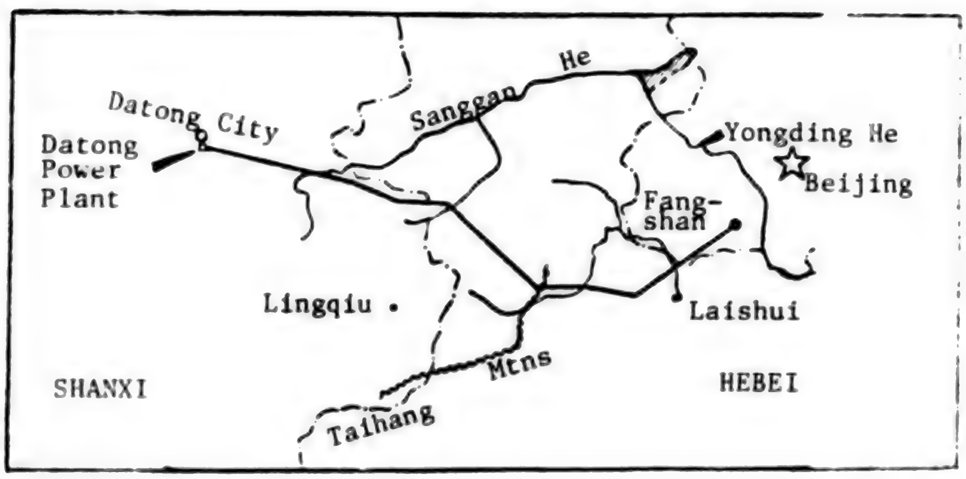
POWER NETWORK

WORK STEPPED UP ON NORTH CHINA'S FIRST 500,000-VOLT POWER LINE

Beijing BEIJING RIBAO in Chinese 16 Nov 82 p 1

[Article by Zhang Hu [1728 5706] and Zhang Andong [1728 1344 2639]]

[Excerpts] Construction of North China's first 500,000-volt ultrahigh-tension power line across the Taihang [1132 5887] mountain range is now being accelerated.



This power line will run from Datong No 2 Power Plant, via Shanxi and Hebei, to Beijing. It will be 300 kilometers long. To date, work has been completed on 90 percent of the metal tower bases and 37 percent of the combination towers; over 30 kilometers of the power line have been put up. Work on electricity generation and conversion is also in progress. Meanwhile, the Datong No 2 Power Plant is being built. Transformer facilities are also being installed in Bejing.

At present, there are only 10-odd countries in the world that are building these 500,000-volt ultrahigh-tension power lines. There are even fewer countries that design their own systems and provide their own materials and equipment. This large-scale, 500,000-volt ultrahigh-tension power line being constructed in North China is entirely designed by our country. In addition, most of the materials and equipment required are manufactured domestically.

When the power line is completed, it will directly supply electricity generated from the Datong coal mines to Beijing. It will greatly increase Beijing's supply of electricity and will be the equivalent of having a large electricity generation plant built right in Beijing. The difference is, it will do away with the need to transport coal to Beijing for electricity generation and eliminate the pollution created by such a facility, were it built there. It will also greatly lessen the severity of electricity shortages in the Beijing-Tianjin-Tangshan area and will play a very important role in the economic modernization of Beijing and the northern China area.

At present, construction is underway on the first phase of the 500,000-volt ultrahigh-tension power line project. The design of the second phase is being handled by the Shanxi and Beijing Electric Power Design Institutes.

12273
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POWER NETWORK

COMPLETION OF TAIZHOU PROJECT IS BIG BOOST TO ZHEJIANG POWER NETWORK

Hangzhou ZHEJIANG RIBAO in Chinese 23 Nov 82 p 1

/Commentary/

/Text/ The largest existing electric power transmission project in our province--the power transmission line from Taizhou Electric Power Plant to Linhai and Jinhua--has been victoriously completed and has successfully joined the East China Grid. We express warm congratulations.

The completion of this project is a crucial step in integrating the existing small power networks in the southeastern part of our province with the East China network and assuring safety in power supply by the Taizhou Electric Power Plant. It is of key significance to improving the state of power supply in our province. After 30 years of construction and transformation, the shattered electric power network in our province has changed its appearance and has vigorously supported national economic growth. However, Wenzhou and Zhoushan prefectures have not yet merged with the East China Grid. Parts of Lishui, Taizhou and Jinhua prefectures which have already joined the East China Grid are still incomplete. Many problems concerning the quantity and quality of power supply remain unresolved. The impact on the development of industrial and agricultural production in these prefectures is considerable. The completion of the power transmission project from Taizhou Electric Power Plant to Linhai and Jinhua has not only completed the merging of the small power networks in parts of Taizhou, Linhai and Jinhua prefectures with the East China Grid, but has also provided the highly important conditions for networks in the entire southern Zhejiang to merge with it. After the completion of the power transmission project from Taizhou Electric Power Plant to Wenzhou, whose construction has already begun, the whole province will have a unified, large power network. At that time the structure of the entire power network in our province will be even more rational and power supply will be even more dependable. It will not only economize a large amount of energy but also play a major role in the economic development of our province particularly the southern Zhejiang area.

In the construction of the power transmission project from Taizhou Electric Power Plant to Linhai and Jinhua, the entire staff of the provincial power transmission engineering corporation under the vigorous support of the design departments and concerned prefectures and counties carried forward the spirit of arduous struggle, dared to fight tough battles and were good at fighting

tough battles, and the results have been outstanding. It is hoped that in constructing the power transmission project from Taizhou Power Plant to Wenzhou, the broad masses of staff and workers of this corporation will further carry forward the fine work style, make persistent efforts, complete this glorious and arduous task with high quality and efficiency, and make even greater contributions to the "four modernizations." At the same time, it is also hoped that all leading departments and the broad masses of people along the line of the project will give earnest and effective support.

9586
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POWER NETWORK

LARGEST POWER TRANSMISSION PROJECT IN ZHEJIANG COMPLETED

Hangzhou ZHEJIANG RIBAO in Chinese 23 Nov 82 p 1

/Article: "The Largest Power Transmission Project in Zhejiang Has Been Completed and Put in Service; Provincial Electric Power Bureau Holds Victory Rally, Comrades in Charge of Provincial Party Committee Give Awards to Provincial Power Transmission Engineering Corporation"/

/Text/ The largest existing power transmission project in our province--the 220,000-volt power transmission for Taizhou, Linhai and Jinhua--formally merged with the East China Grid on 8 November and began the supply of power to Taizhou Prefecture. In the afternoon of 22 November, the Zhejiang Electric Power Bureau held a victory and oath-taking rally for the provincial power transmission engineering corporation. Deputy Secretary Cui Jian /1508 0256/ of the provincial party committee, standing committee member of the provincial party committee and provincial vice governor, Li Kechang /2621 0344 2490/, and other leading comrades attended the rally and gave out pennants and certificates of merit, while the provincial electric power bureau gave out prizes and cash awards.

The Zhejiang Power Transmission Engineering Corporation is a fine construction enterprise of the Ministry of Water Conservancy and Electric Power. In the 25 years since its formation, this enterprise has constructed over 130 substations and more than 5,600 kilometers of high-tension transmission lines throughout the province. Particularly since the Third Plenary Session of the 11th Party Central Committee, this corporation has put forward the work style of arduous struggle of daring to fight tough battles, and has built with high quality and speed 21 substations of 110,000 and 220,000 volts in succession, a total transformer capacity of 870,000 KVA, as well as 12 transmission lines totaling almost 1,000 kilometers. On 8 November the largest power transmission project in our province at present, built and installed by this corporation for power transmission from Taizhou Electric Power Plant to Jinhua via Linhai, was victoriously completed. After 24 hours of experimental transmission, it has been merged successfully with the East China Grid. After it was switched on, checked and accepted, the quality of power was rated as excellent. The staff of this corporation is now turning to another large-scale power transmission project in southern Zhejiang--the construction of a 220,000-volt transmission line from Taizhou to Linhai and Wenzhou.

9586
CSO: 4013/75

POWER NETWORK

ZHEJIANG MAKES MORE ELECTRICITY AVAILABLE TO INDUSTRY, AGRICULTURE

Hangzhou ZHEJIANG RIBAO in Chinese 28 Aug 82 p 1

[Article by Yin Zuoyou [3009 0155 0645]: "Great Achievements Have Been Made in Our Province's Buildup of Electric Power"]

[Text] In the 3 years since the Third Plenum of the Party, the amount of electricity for industrial use in our province increased 38 percent and the amount of electricity for agricultural use grew 63 percent. This has forcefully stimulated economic development throughout the province. This is a rich achievement realized by our province's electric power industry in implementing the policy of readjustment.

To quickly build up our province's electric power industry, the state spent 600 million yuan between 1979 and 1982 to hasten the construction of electric power and the improvement of the power network in Zhejiang. As of the first half of this year, installation of two 125,000-kilowatt generators was completed at the Zhenghai Power Plant and thermal power plants at Meiju in Wenzhou, at Dongyu, at Dinghai in Zhoushan and at Daishan were expanded or newly built, the hydroelectric power plant on the Wuxi Jiang, with an installed capacity of 170,000 kilowatts, and a number of small hydroelectric power stations were completed. In addition, the trunk power transmission line of 220 kilovolts and substation projects from Zhenghai to Ningbo, Shaoxing, Xiaoshan, Hangzhou to Jiaxing, Fuchun Jiang to Jinhua, Quzhou, Xiaoshan to Huzhou, and Changzhou were completed, and 56 substations over 35 kilovolts with a total transformer capacity of 1,600,000 kilovolt-amperes were built. Over 8,000 kilometers of 10-kilovolt high voltage lines were laid. In villages, many makeshift substations and power lines not meeting the requirements were improved. The structure of the power network was readjusted by new construction, reorganization and improvement. Its layout was made rational and the quality of voltage and the level of safe, economical operation improved.

9296
CSO: 4013/170

PROVINCIAL POWER CHIEF DISCUSSES EXPANSION OF SHANXI POWER INDUSTRY

Taiyuan SHANXI RIBAO in Chinese 26 Oct 82 p 1

[Article: "Shanxi Electric Power Bureau Director Tian Ying [3944 5391] Reviews Past and Future, Asserts With Confidence: Power Generation in Shanxi Will Definitely Take on a New Aspect"]

[Excerpts] Tian Ying, director of the Shanxi Electric Power Industry Bureau, reviewing the past development of power generation in Shanxi and anticipating a glorious future, confidently asserts that it is entirely possible to quintuple electric power within the next 20 years.

Tian Ying said that the 12th Party Congress has proposed the magnificent goal of quadrupling the annual gross value of China's industrial and agricultural production by the end of this century, and that energy is a strategic point in realizing this goal. Shanxi is an energy resource and heavy chemical industry base, as well as a thermal power base for the entire country. Our electric power must not only fulfill the needs of quadrupling the annual gross value of our own industrial and agricultural production, we must also supply power to Beijing and our brother provinces and municipalities. For this reason Shanxi's power industry should advance even faster and better. It should be in the vanguard.

In the 33 years since liberation, Shanxi's power industry has grown at an average annual rate of 14 percent. This is a rapid rate. However, the weak base from which Shanxi's power industry started just after liberation, together with the prolonged period of "leftist" disruption, resulted in imbalances between the electric power industry and the national economy, and within the electric power industry itself. This led to severe power shortages in the 1970's. Since the Third Plenary Session of the Party, we have conscientiously implemented the policies of "readjustment, restructuring, reorganization, and upgrading" our national economy. On the one hand we have worked to tap potential, renovate, and restructure existing enterprises in order to correct imbalances within the electric power industry, and on the other we have worked on capital construction, continuously increasing generating capacity in order to resolve once and for all the contradiction between the power industry and national economic development. Work has been done in the following areas in the last 3 years. Power generation: the potential of existing equipment has been brought into full play through technical transformation. Power grids: such problems as "bottlenecks" in the power grids

and situations in which some regions "have power which can't be transmitted, or transmit power which can't be used" have been resolved primarily by perfecting the power grid. Basic construction: in the last 3 years construction has been completed on the second phase of the Shentou Power Plant, and the 3rd and 4th generators of the Niangziguan Power Plant--electric power generating capacity has been increased by 630,000 kw, or 31 percent. Construction has been completed on 712 km of transmission lines of 110 kv or more; transformer capacity is 810,000 kVA. Shanxi Province now has an installed generating capacity of 2.68 million kw; over 4,000 km of transmission lines of 110 kv or more; 7,321 km of transmission lines of 35 kv; and over 60,000 km of transmission lines of 10 kv. A 220 kv power grid already covers the province and is linked to the Beijing-Tianjin-Tangshan power grid. Today, Shanxi not only generates enough power to fulfill its own needs, but also frequently supplies power to the Beijing-Tianjin-Tangshan power grid.

In the mass fervor of study and propagation of the spirit of the 12th National Party Congress, our bureau party committee and the broad numbers of workers have summarized actual experiences in Shanxi's electric power industry, studied the documents, aroused enthusiasm, and devised plans and measures. Everyone has resolved to advance in the direction indicated by the 12th Party Congress, and to open up a new situation in Shanxi's electric power industry. Our initial plan is to double our generating capacity in the first decade, and then to triple it in the second decade: this will contribute to the quadrupling of the annual gross value of Shanxi's industrial and agricultural production, and also help to supply power to Beijing. The actual figures are based on Shanxi's 1980 installed capacity of 2.38 kw, generating 11.9 billion kwh; by 1990 we should attain an installed capacity of 6.98 million kw, generating 35 billion kwh; and by the year 2000 we should attain an installed capacity of 17.47 million kw, generating 85 billion kwh. Besides fulfilling the power needs of Shanxi, this will enable us to supply other provinces with 11.1 billion kwh in 1990, and 26 billion kwh in the year 2000.

Can this goal be realized? After careful consideration, the answer of our bureau party committee is "Yes." There are many favorable factors. First, the party central committee has made energy into a major strategic point, and has specified a correct orientation and policies for developing the electric power industry which are suited to China's national conditions. Second, Shanxi is very rich in coal reserves, and the state attaches great importance to the construction of Shanxi's energy resource and heavy chemical industry bases. The development and exploitation of our coal resources will certainly stimulate the development of our electric power industry. Although Shanxi's water resources are relatively weak, nevertheless with unified planning and rational allocation, combined with water saving measures adopted by our electric power departments, the water problem can also be solved. Third, since liberation a power grid has been taking shape in Shanxi, experience has been accumulated, and a contingent of over 50,000 electric power workers has already been nurtured. We have 2,729 engineers and technicians, of whom 844 are ranked as engineers or above. Finally, from an historical point of view, Shanxi's generating capacity quadrupled in only 13 years from 1965 to 1978. Therefore it is entirely possible for us to quintuple capacity in the next 20 years.

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BRIEFS

1982 INSTALLED CAPACITY--China put 1,988,000 kilowatts of installed capacity power generation into operation in 1982. As of 28 December 1982, the nation had put into operation 1,988,000 kilowatts of installed power generation capacity, exceeding the state's annual plan. Twelve thermal power plants with a total installed capacity of 1,353,000 kilowatts were completed and put into operation. Seven hydropower generators with a total installed capacity of 630,000 kilowatts were completed and put into operation. [Text] [Beijing RENMIN RIBAO in Chinese 3 Jan 83 p 2]

GUANGDONG 1982 POWER OUTPUT--Guangdong's electric power output has exceeded the yearly plan. As of 10 December [1982], the province's electric power output had reached 12.6 billion kilowatt-hours, 200 million kilowatt-hours above the plan and 12.9 percent more than that produced in the same period last year. Consumption, industrial and private use, transmission loss, etc, were greatly reduced compared to the year before. This year, Guangdong added no large generator plants and at the same time fuel for power generation was in short supply and there was less water in the reservoirs. As a result, Guangdong's electric power industry used every means available to squeeze the last bit of power from existing facilities and worked hard to reduce the level of consumption. While increasing the proportion of high-temperature, high-voltage equipment, thermal power plants carried out technical improvements, eliminated equipment defects, and increased power generation capacity. The province's consumption of coal in its power plants was reduced by 3 grams [per kilowatt-hour of electricity produced] compared to last year for a saving of 22,000 tons of standard coal. Hydropower stations concentrated on production management, improved economic management and used water resources to the fullest. The province's seven major hydropower stations this year recorded a 11.5 percent drop in water flow compared to last year, but power generation actually increased by 14.6 percent. [Text] [Guangzhou NANFANG RIBAO in Chinese 14 Dec 82 p 1]

HENGSHUI-CANGZHOU 220KV POWER LINE--The Hengshui-Cangzhou 220,000-volt power transmission line was completed on the eve of the new year. This line has a total length of 127.7 kilometers and passes through the five counties of Hengshui, Wuyi, Jiaohe, Nanpi, and Cangxian. The completion of the line will relieve the power shortage in Cangzhou and Hengshui prefectures and brings the link-up of the Shijiazhuang-Handan and the Beijing-Tianjin-Tangshan power grids one step nearer to completion and hastens the overall development of the economic benefits of the larger grid. [Text] [Shijiazhuang HEIBEI RIBAO in Chinese 2 Jan 83 p 1]

HANDAN SUBSTATION COMPLETED--Another big substation has been compelted. One of Hebei's major power transmission capital construction projects, the 220kv transformer station in the northeastern suburbs of Handan, was completed on the eve of the new year. [Text] [Shijiazhuang HEBEI RIBAO in Chinese 3 Jan 83 p 1]

NORTHEAST POWER OUTPUT UP--As of 25 December 1982, the Northeast Electric Power Bureau had completed the state's yearly power generation plan 6 days ahead of schedule, producing a total of 51,010,000,000 kilowatt-hours of electricity, an increase of 1.9 percent over the same period last year. The amount of coal used to generate each kilowatt-hour of electricity dropped 3 grams compared to the same period of last year, a saving of 140,000 tons of standard coal. Use of fuel oil went down by 400,000 tons and current [cycle] quality was up to 99.999 percent of the standard. The average daily thermal power output during the 4th quarter, a peak load season, was more than 10 million kilowatt-hours. [Text] [Shenyang LIAONING RIBAO in Chinese 28 Dec 82 p 2]

SOUTHERN SHANXI 220KV LINE--The Huoxian-Yuncheng 220,000-volt power transmission line replacement project was completed yesterday. With a total length of 162 kilometers, it is the biggest transmission line in southern Shanxi Province. In order to ensure electricity for winter irrigation, the Ministry of Water Conservancy and Electric Power approved the replacement of 30 large steel towers. The original plan called for the completion of the plan in the period 17-31 December, but the job was finished 4 days early thanks to the extra effort of the personnel involved. [Text] [Taiyuan SHANXI RIBAO in Chinese 28 Dec 82 p 1]

CSO: 4013/128

STATUS REPORT ON DONGJIANG, NANYA HE HYDROELECTRIC PROJECTS

Beijing SHUILI FADIAN [WATER POWER] in Chinese, No 11, 12 Nov 82 p 48

[Article by Zhang Jihua [1728 4949 5478] in the column: "Hydroelectric Power Stations Under Construction"]

[Text] Dongjiang Hydroelectric Power Station

The Dongjiang Hydroelectric Power Station is in the gorge 10 kilometers above the town of Dongjiang in Zixing County on the upper reaches of the Lai Shui in Hunan Province. It is 285 kilometers from the river mouth. The Lai Shui is a tributary of the Xiang Jiang.

The mainstream is 439 kilometers long. The area of the river valley above the dam site of the hydroelectric power station is 4,720 square kilometers, constituting about 40 percent of the area of the whole river valley. The power station is about 50 kilometers from Chenzhou and there is already a highway connecting the two places. The station is only 14 kilometers from the Mugengqiao Station on the Xujiadong-Sandu Line, a branch of the Beijing-Guangzhou Railroad. Transportation to the outside is very convenient.

The total installed capacity of the Dongjiang Hydroelectric Power Station is 500,000 kilowatts. The annual average output is 1.32 billion kilowatt-hours. After completion of the project, it will serve to prevent flooding of the farmland on both banks of the lower reaches and it can also improve the flood prevention standards of the two downstream power stations at Baiyutan and Yaotian and the Laiyang station on the Beijing-Guangzhou Railroad. After the reservoir stores water, its capacity will reach 8.12 billion cubic meters. This will improve navigational conditions upstream and downstream, provide cooling water for the downstream Liyujiang Thermal Power Plant, and will promote fish cultivation. It is estimated that the annual catch can reach 500,000 tons.

The main project of the hydroelectric power station includes a river dam, a power plant and flood discharge structures. The dam is a concrete double curvature arch dam with a top elevation of 294.0 meters. The maximum dam height is 157 meters and the maximum width is 35 meters. The top of the dam is 9 meters wide. The dam is 438 meters long. The central angle at the top of the dam is 100° and the outer radius is 256 meters. The water diversion

structure on the body of the dam consists of 4 water diversion holes in front of the dam and four steel pipes 5.2 meters in diameter. The elevation of the center of the water intake floodgate is 223 meters. The powerhouse of the station is in the rear of the dam. It is 106 meters long, 56.3 meters high and 23 meters wide. Four 125,000-kilowatt hydraulic turbine generators are installed.

Spillways are built on the left and right banks. Each has two holes and both are ski-jump types. They separate the flow into two levels, one high and one low. The elevation of the top of the weir is 266 meters. The holes are 10 meters wide and 7.5 meters high. The intakes have 10x10-meter flat boards for inspecting the floodgates. The exits have a 10x7.5-meter arc working floodgate controlled by a 2x63-ton gate opening and closing machine. Single generator discharge is 1,300 cubic meters/second.

The emptying of the reservoir is set as follows: In ordinary situations, the water is released at the normal high-water level until the water level drops to the stationary water level. This is accomplished by the first level discharge tunnel. Under special situations, the water is released from the stationary water level by the second level discharge tunnel until the reservoir is emptied. The first level discharge tunnel is on the left bank. It is 346 meters long. The intake floor is at an elevation of 222.0 meters. There is a section with a diameter of 10 meters that is 201 meters long. The section of the pressure-free segment is 8.5x12 meters and 145 meters long. The maximum discharge of the tunnel is 1,942 cubic meters/second. Besides satisfying the requirements for emptying the reservoir, it also participates in the discharge of flood waters to be encountered every 100 years or more. The second level discharge tunnel is on the right bank. The intake floodgate is at an elevation of 170.0 meters. The total length is 595 meters. The pressured segment of the tunnel has a diameter of 8.5 meters and a length of 332 meters. The pressure-free section is 7.2x12 meters and 263 meters long.

To solve the problem of passing logs coming from upstream, an 8x5.3-meter tunnel type log passageway is built on the right bank. The passageway is 1,200 meters long. It has two longitudinal log transporting machines which can allow passage of about 300,000 cubic meters of timber a year.

The design work for the main project is as follows: excavating 5,610,000 cubic meters of earth and rock, pouring 1,690,000 cubic meters of concrete, and grouting 120,000 meters. The Dongjiang Hydroelectric Power Station is designed by the Central South Surveying and Design Institute of the Ministry of Water Conservancy and Electric Power. The Eighth Engineering Bureau of the Ministry of Water Conservancy and Electric Power is in charge of construction. Work began in February 1978 and construction of the main project began in September the next year. The tunnel diversion plan is used. There are concrete overflow weirs upstream and downstream. The diversion tunnel has a diameter of 13 meters and a total length of 551 meters. Flow interception was accomplished on 14 November 1980.

The base rock of the Dongjiang dam is fine granular and coarse granular porphyritic granite. The lithological character is hard. To guarantee construction safety and to prevent the effects of vibration of the foundation from blasting, we successfully used pre-crack blasting. Now, excavation of the dam shoulders on the two banks has been basically completed. Excavation on the left bank has reached an elevation of 165 meters and excavation on the right bank has reached an elevation of 195 meters.

The body of the dam is planned for pouring concrete in cast sections without longitudinal seams. The total amount of concrete for the dam will be about 1 million cubic meters. The design arrangement calls for pouring a monthly average of 20,000 cubic meters. The average monthly construction height would be about 3.5 meters. The annual maximum would be 300,000 cubic meters. A 10-ton cable crane and two 20-ton cable cranes would be used to lift containers of 3 cubic meters and 6 cubic meters to pour the concrete.

At present, the foundation of the dam, the first level and second level discharge tunnels, the spillway and the traffic tunnel into the site are being excavated. Auxiliary enterprises for separating sand and stone, a concrete mixing system and a cooling system are being built. Production and living facilities on the project site have been basically finished. It is expected that pouring concrete for the large dam will begin in the fourth quarter of next year [1983].

The Third Cascade Hydroelectric Power Station on the Nanya He

The Nanya He flows inside Shimian County in Sichuan Province. It is a tributary on the right bank of the middle reaches of the Dadu He. Nanya He is planned for development by 6 cascade stations with total installed capacity of about 540,000 kilowatts. The second cascade power station was completed in 1973. Its three generators have a total capacity of 14,500 kilowatts, all now in operation.

The third cascade station is immediately upstream from the second cascade power station. It utilizes the natural fall of 280 meters of a river segment about 9 kilometers long extending from the Yaohe Dam, 21 kilometers from the Shimian County seat, to the shoals above the Nanguadian Bridge to divert water for generating electricity.

The first part of the main project consists of a floodgate dam, an open diversion canal and a sand sedimentation pool. The floodgate dam is a concrete gravity dam. The maximum dam height is 20 meters and the total length is 123 meters. The section over the riverbed consists of a dam segment with bottom tunnels and an overflow dam segment. The total length is 40.5 meters. The foundation of the floodgate dam consists of pebble mixed with drift rock and lumpy rock of from 15 to 28 meters thick. A concrete water intercepting wall is used. The open diversion canal is 7 meters wide and about 152 meters long. The design total amount of diversion is 78.4 cubic meters/second. The sand sedimentation pool is a single chamber with a net width of 26 meters and a total length of 165 meters. There are two types of facilities, one for periodic sand removal and another for continuous sand

removal. The design speed of flow inside the pool is 0.35 to 0.40 meters/second. The computed value of the guaranteed rate of sedimentation of harmful granules of sand with a diameter larger than 0.25 millimeters is 79.1 percent.

The diversion tunnel for the power station is a round pressured tunnel. The inner diameter is 4.5 meters and the length is 7,016 meters. The pressure regulating well is of the differential type. The inner diameter is 14.0 meters, the well is 48.5 meters high and the wall thickness is 50 centimeters. Inside the pressure regulating well is a 3.5x4.5-meter plate emergency floodgate operated by a fixed gate controller at the top of the well. The inner diameter of the main steel pressure pipe is 3.5 meters. There are two branch pipes branching at an angle of 50°. The total length is 827 meters.

The powerhouse of the station sits on the gound surface. It is 38.4 meters long and 15.2 meters wide. Three 40,000-kilowatt generators totaling 120,000 kilowatts will be installed in the powerhouse. The annual average output of electricity will be 653 million kilowatt-hours.

The power station is designed by the Chengdu Surveying and Design Institute. The Nanya He Subbureau of the Seventh Engineering Bureau is in charge of construction. The design total amount of work is as follows: excavating 1,574,000 cubic meters of earth and rock, and pouring 350,000 cubic meters of concrete. At present, the head of the floodgate has been basically completed. Defects are being repaired and observation facilities are being constructed. The diversion tunnel has been basically completed. Only a part of the grouting portion of the civil engineering work of the pressure regulating well is still not completed. The frames of the 220,000-volt switching station have been completely installed and its facilities are being installed. The No 2 and No 3 generators of the power station have already been installed and the power station will be set to generate power before the end of the year.

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JIANGDU, NATION'S LARGEST POWER-DRAINAGE-IRRIGATION PROJECT, DESCRIBED

Beijing RENMIN RIBAO in Chinese 26 Sep 82 p 2

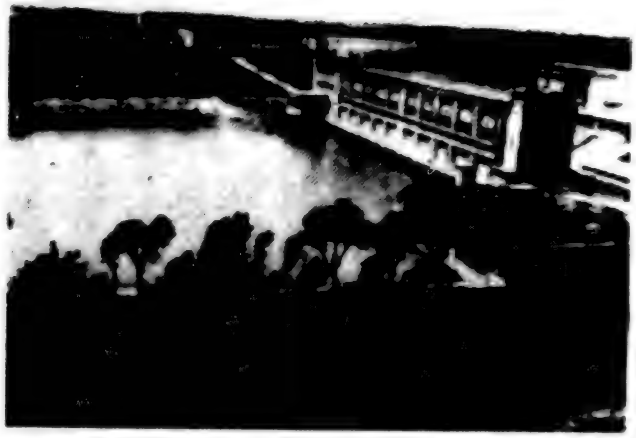
[Text] China's largest electric power, drainage and irrigation project--the Jiangdu Pumping Station in Jiangsu Province--recently was evaluated by the National Quality Evaluation Committee as a superior quality project of the nation. Since completion of this station and since production began, it has already pumped and diverted by gravity 77.99 billion cubic meters of water from the Chang Jiang, more than 50 percent of the annual runoff of the Huang He. Its completion has changed the conditions for production in 25 counties and cities in the region, and it has transformed northern Jiangsu, which has been historically a victim of many disasters and a poor region, into an important commercial food grain base of the province. For 19 years, this region has produced a total of 50 billion jin of food grains, averaging an annual increase of 6 percent.

The Jiangdu Pumping Station is located south of Jiangdu County in Jiangsu Province at the confluence of the Chang Jiang, the channel of the Huai He that enters the Chang Jiang, the Beijing-Hangzhou Canal and the Xintongyang Canal. Historically, because the Huang He overwhelmed the Huai He and brought a lot of mud and sand which silted and plugged the outlet of the Huai He, the Huai He system was seriously damaged. The broad area at the lower reaches of the Huai He, the Qi He, the Shu He and the Si Shui became a disaster area where "great disasters occur when rain is heavy, small disasters occur when rain is light, drought occurs when there is no rain, there are no harvests 9 out of 10 years." The Jiangdu Pumping Station is an important part of the project by the people of northern Jiangsu under the leadership of the party to dredge the Huai He. It includes four large electric power and drainage and irrigation stations with a designed pumping capacity of 400 cubic meters per second. Auxiliary projects included 12 control floodgates, 5 boat locks, and 2 trunk water conduits. It is a large water conservancy and comprehensive utilization project that regulates water across river valleys, sends water over long distances, irrigates, drains waterlogging and flood waters, modulates phases, generates electricity, regulates the water level for navigation, and provides water for industry and agriculture in the towns and villages. According to the requirement for unified planning and construction in phases, work began in 1961. By 1979, all projects, including the main project and all auxiliary projects were completed. During the course of construction, the departments of machinery,

electric power, civil engineering and construction and water conservancy cooperated with each other, overcame difficulties, and realized one victory after another. The water pump of 3.1 meters in diameter with a pumping capacity of 210 cubic meters per second was developed by the manufacturing departments after many improvements. The siphoning waterflow outlet used for the first time in the nation and the vacuum filling valve designed and installed have provided a reliable guarantee for safe operation.

In years of drought, the Jiangdu Pumping Station pumps water from the Chang Jiang and sends the water into the Jing-Hang Canal, the main irrigation canal in northern Jiangsu, to irrigate more than 3 million mu of farmland. Through the auxiliary projects, the water of the Chang Jiang is diverted into the Xintongyang Canal and sent to the heartland of the Lixia He to irrigate over 7 million mu of farmland. It can also pump the water of the Chang Jiang to supplement the Hongze Hu and send water to Xuzhou and Lianyungang cities. During the rainy and waterlogging seasons, Jiangdu Pumping Station can promptly drain the water from the waterlogged 4,000 square kilometers in the Lixia He area in northern Jiangsu into the Chang Jiang. Each day, it can reduce the level of waterlogging by 7 centimeters. This July, torrential rains continued to fall in northern Jiangsu. All 33 generators of the pumping station operated to drain waterlogging, and they discharged an average of 40 million cubic meters of water a day. The auxiliary projects drained 500 million cubic meters of flood water a day, enabling this region's autumn crops to avoid disaster.

For 19 years, the Jiangdu Pumping Station has pumped and diverted a total of 31.4 billion cubic meters of the Chang Jiang's water and pumped and drained 8.25 billion cubic meters of waterlogging. The auxiliary projects diverted 46.59 billion cubic meters of water from the Chang Jiang by gravity, and drained 349.28 billion cubic meters of flood water. On the average, they diverted 4.1 billion cubic meters of the Chang Jiang's water by pumping and by gravity diversion, equivalent to half of the amount of water stored in Hongze Hu. According to statistics, income from increased agricultural production in this region alone has surpassed the total investment in the project by several times. The completion of the Jiangdu Pumping Station has also improved the condition for navigation in the Jing-Hang Canal and has provided large amounts of water for production and living by 10 million people.



China's largest electric power and drainage and irrigation project at present --Jiangdu Pumping Station in Jiangsu Province. It consists of 4 stations with 33 large generators and 33 large water pumps. It has a total installed capacity of 49,800 kilowatts and its pumping capacity is 400 m^3 per second.

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CSO: 4013/9

EXCAVATION STEPPED UP ON DIVERSION TUNNEL OF JINSHUITAN HYDROPOWER STATION

Hangzhou ZHEJIANG RIBAO in Chinese, 2 Oct 82 p 1

[Article by Qiao Jianping [0829 1696 1627]: "Excavation of Diversion Tunnel of Jinshuitan Power Station Hastens, Highest Tunneling Record Achieved Between 1 and 17 September"]

[Text] The broad number of cadres and workers of the 12th Construction Bureau of the Ministry of Water Conservancy and Electric Power working at the site of the Jinshuitan Power Station is riding the East [is Red] wind of the 12th Party Congress and has accelerated the construction of the power station. From 1 to 17 September, they tunneled 82 meters of the diversion tunnel and lined 50 meters of the concrete arch ceiling, an increase of more than 64 percent and more than three times the amount of work performed during the entire month of August. They created the highest tunneling record since excavation of the Jinshuitan Project began.

Jinshuitan Power Station is situated at Jinshuitan, 18 Kilometers from the Yunhe County seat. It is the first hydropower station to be built on the main stream of the Ou Jiang. It has an installed capacity of 200,000 kilowatts, second only to the Xinan Jiang and Fuchun Jiang hydropower stations. After completion, it can transmit 500 million kilowatt-hours of electricity to the East China and the Zhejiang power networks each year, and it can also serve a regulatory function and as a reserve. It will surely ease the conflict between supply and demand of electricity in our province and in developing industrial and agricultural production. At present, the entire construction site is concentrating forces to develop excavation for the diversion tunnel of the power station.

Excavating the diversion tunnel is a key construction project of the early period in building power stations. It requires tunneling a diversion tunnel with a total length of 424 meters, a height of 15.7 meters and a width of 10 meters. Over 180,000 cubic meters of rock must be excavated. To make the wall of the tunnel smooth and less coarse, and to make the amount of flow large, the tunnel wall must be lined with reinforced concrete. The task is very difficult. After hearing the news of the victorious convening of the 12th Party Congress, the cadres and workers of this bureau were greatly encouraged. The workers said: Comrade Hu Yaobang pointed out in his report, the "most important thing is to solve the agricultural problem, the energy and

transportation problems, and problems in education and science" in order to stimulate the overall elevation of the socialist economy. The energy problem is a key strategic point. We who are involved in the buildup of hydroelectricity must grasp the development of energy well and the building of power stations. This is the best practical action we can take to celebrate the 12th Party Congress. The workers of the First Engineering Department in charge of excavating the diversion tunnel went ahead alone and repaired a triple-arm drilling vehicle 3 days ahead of time. By 3 September, that department had already completed 86 percent of the tunneling schedule, an increase of 40 percent in work efficiency compared to the same period last month. Workers of the Second Engineering Department wanted to guarantee the quality of the concrete lining of the arch ceiling of the diversion tunnel, so they held the mixer in their hands, knelt inside the narrow and stuffy tunnel filled with steel members and worked. Sweat soaked their clothes, cement mortar poured down their necks, but they did not care. They worked hard before they got tired. Workers of different types of jobs cooperated closely. From 1 to 13 September, they poured a total of 782 cubic meters of concrete, completing the plan with time to spare. The middle shift also created a new record of pouring 134.28 cubic meters of concrete on the 13th, and the quality improved over that of the previous month.

Now, preliminary construction of the Jinshuitan Power Station is progressing steadily. The workers of the entire bureau are determined to strive to intercept the flow for the power station by next year under the drive of the spirit of the 12th Party Congress.

Construction site of the diversion tunnel of Jinshuitan Power Station.

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HYDROPOWER

FUJIAN COUNTIES REPORT ECONOMIC SUCCESS OF SMALL-SCALE HYDROPOWER

Fuzhou FUJIAN RIBAO in Chinese 13 Nov 82 p 1

/Article by correspondents Liu Chengye /0491 2052 2814/, Li Guangchun /2621 0342 2504/, and Zhu Tiancheng /2612 1131 6134//

/Text/ In recent years, the rapid development of small-scale hydropower in three of the counties in Fujian Province, Yongchun, Yongan, and Yongtai, has made significant contributions to the industrial and agricultural production and to the people's living standard.

Yongchun County, which became famous back in the 50's for its achievements in small-scale hydropower, has constructed in the last 3 years a number of power stations with a total capacity of more than 7,100 kw; it has also built several main stations each having a capacity larger than 1000 kw. Furthermore, power generation techniques have advanced from the old direct-flow method to the diverted-flow method and combination water reservoir and power generation. Small hydropower stations have been constructed in conjunction with other projects such as irrigation and flood prevention, bridge and highway construction, cultivation of hilly farmland, and water conservation. Also an electric network has been established which includes 76 percent of the power generation capacity in the county. Currently, 275 small hydropower stations in the county have been completed, with a total capacity of more than 23,300 kw, and an annual output of 65 million kwh. Electricity is available to all the communes, villages, farms and orchards, production brigades, and 86 percent of the production teams in the county.

The availability of small hydropower accelerated the development of county-owned industries and commune enterprises. In 1981, the total industrial output of the county reached 45 million yuan; the number of commune enterprises increased to 854, with annual output of more than 26 million yuan. The county also built over 140 electric irrigation stations, which provide water to more than 100,000 acres and electric power to more than 6,000 pieces agricultural processing equipment.

The installation of electric power raised the income for the county, the communes, and the brigades. The annual income from electricity fees alone was over 2.5 million yuan. In an effort to preserve forests and reduce the consumption of firewood, the county conducted experiments at Penghu Commune to use electric rice cookers and other household appliances.

Since 1978, 212 hydropower stations have been built in Yongan County, which is rich in hydraulic resources; these stations were built jointly by the county, the communes, and the brigades. The total capacity amounts to more than 26,000 kw and the annual output is more than 80 million kwh. There are nine main stations each with a capacity exceeding 1,000 kw. Currently, a total capacity of 17,000 kw is linked to the national power grid.

The rapid advancement in small hydropower construction in the county has brought significant changes to the industrial and agricultural production and to the enterprises owned by communes and brigades. One-third of the electricity consumed by local factories and mines owned by the national, provincial, regional, and county governments is supplied by small-scale hydropower stations. The annual production in the county supported by electric power reached 130 million yuan. The Xiyang Commune had built 40 small-scale hydropower stations in recent years, with a total capacity of 3,100 kw and an average capacity of 1 kw per household. The commune not only uses electricity for illumination, irrigation, and processing of bamboo, wood, and tea, but has also established many enterprises such as a fairly large carving factory, a bamboo mat factory, a plywood factory, and an aluminum pot and pan factory. Both production level and profits have increased by a considerable amount. The 10,000-kw Yamutan turbine pumping station, which has been in operation for just over a year, has received over 2.6 million yuan; its total investment can be recovered in 4 to 5 years.

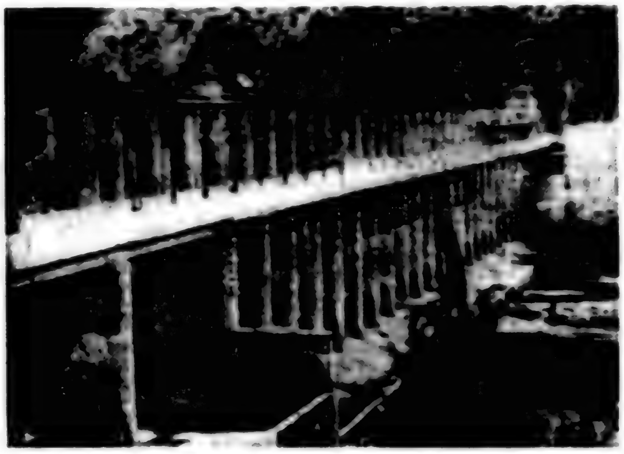
Yongtai County, which is located near the foot of the Daiyun Mountains, and is endowed with criss-crossing rivers and streams, has constructed 43 new hydropower stations since the 11th Central Committee Conference. These construction projects were undertaken by the county, and by joint efforts between the county and communes, between the communes, or between the brigades. At the end of 1981, the county had completed a total of 137 small-scale hydropower stations, with a total capacity reaching 10,100 kw, which is double the capacity before 1976. Today, there are 13 hydropower stations under construction, which are expected to provide an additional capacity of 1,500 kw by the end of this year. On the basis of the current capacity of power generation, it is estimated that an additional income of over 1 million yuan per year can be derived from electricity output alone.

The construction of power stations provide the necessary energy sources for the agricultural and industrial production in the entire County. The small-scale hydropower stations supplied approximately 10 million kwh of electricity per year to the paper factories, farm machinery factories, date factories, and agricultural by-product processing plants in the Chengguan region.

The county also constructed five dual-purpose power stations which can be used for power generation as well as irrigation, and 145 irrigation stations which provide water to over 24,000 acres of farmland.

Currently, the development of small-scale hydropower is considered by all three counties as the major issue of economic development. They have established plans and taken appropriate measures to accelerate the construction

of small hydropower stations, so that more energy sources can be provided to achieve the goal of ever increasing industrial and agricultural production.



The Yamutan Turbine-Pump Power Station

3012
CSO: 4013/64

HYDROPOWER

YONGCHUN COUNTY, FUJIAN, HAS AMBITIOUS HYDROPOWER CONSTRUCTION PLANS

Fuzhou FUJIAN RIBAO in Chinese 19 Nov 82 p 1

/Article by correspondent Zhen Shichong /6774 4258 1504//

/Text/ On 3 November, after inspecting the small-scale hydropower facilities in Yongchun county, the Secretary General of the Chinese Communist Party Central Committee, Comrade Hu Yaobang, offered his compliments and suggested that Yongchun County serve as a model community for the electrification of Chinese-style farm villages. Comrade Hu's visit and suggestion greatly motivated the party members, county officials, and the general public in the county. They were all determined to follow Hu's guidance and devote their energy in making the electrification of Chinese villages a reality.

Upon Hu's departure, the county committee invited all the commune party secretaries, department heads of the county government, and industrial leaders to a meeting to convey comrade Hu's message as a result of his inspection tour. The meeting was an event of enthusiastic learning and discussion by the participants; everyone was impressed by Hu's visit to Fujian Province and in particular by his concern for the people of Yongchun County. Following Hu's guidance, the county committee and county government conducted preliminary research and planning activities toward the electrification of farm villages in this county. They established a steering group headed by the county committee secretary, with the county magistrate as the deputy group leaders. The group is responsible for hydroelectric construction on the one hand, and residential electric utility on the other; its objective is to replace the use of firewood and coal by electricity in order to preserve forest resources, and to improve the efficiency of seasonal power consumption. Its goal is to increase its current capacity of 23,000 kw and annual output of 67.81 million kwh [illegible] a capacity of 32,000 kw and annual output of 112.1 million kwh by 198[illegible] total number of farmers using electric cooking facilities is expe[illegible]o exceed 20,000 by that time.

To achieve this goal, the county committee and county government tasked the county hydropower bureau to organize a hydropower conference, which was attended by over 100 representatives from hydropower systems in the county, the Small-Scale Hydropower Company, the Qixia, Huengko, and Wuyi reservoir power stations, and the hydropower bureau. During the conference, the guidance from comrade Hu Yaobang was communicated to the participants and plans to

develop hydropower throughout the county were discussed. In addition, an engineering steering group for the Yudou transformer station was formed jointly by the county finance committee, the industrial bureau, and the Hangzukou and Yudou communes. The steering group selected the site of the transformer station, carried out on-site surveys, and drafted a plan for the construction tasks. Manpower was allocated by the county hydropower bureau to organize a hydropower technology group, whose function is to conduct a general inspection of existing small-scale hydropower facilities in the county in order to provide the basis for future modifications and for improving the efficiency of existing power stations. The county committee also met with staff and engineers from the Electric Motor Factory and the Appliance Factory to discuss the production of electric rice cookers.

Everyone involved in the hydropower industry in Yongchun County is determined to devote his total effort toward accomplishing the noble mission suggested by comrade Hu Yaobang.

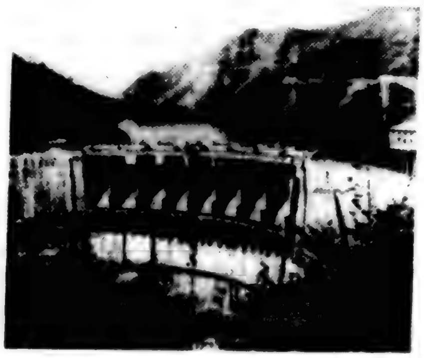
3012
CSO: 4013/64

AWARD-WINNING LISHIMEN DAM INCORPORATES NEW DESIGN FEATURES

Hangzhou ZHEJIANG RIBAO in Chinese, 26 Sept 82 p 1

[Article by Jia Zuhua [6328 4371 5478], "Arch Dam of Lishimen Reservoir Is Cited as Nation's Superior Engineering Project"]

[Text] The National Quality Awards Evaluation Committee has cited the arch dam of our province's Lishimen Reservoir as a superior project awarded the national quality award for 1982.



Lishimen Reservoir is situated on the Shifeng Xi in Tiantai County. The total reservoir capacity is 199 million cubic meters. The installed capacity of the power station is 6,000 kilowatts. It is a large reservoir for multiple utilization built mainly for irrigation but combines functions for flood prevention, generation of electricity and fish culture.

The Lishimen Reservoir was designed by our province's Water Conservancy and Hydroelectric Power Surveying and Design Institute. The large dam uses a new type of concrete double curvature overflow arch dam. The dam height is 74.3 meters. The base of the dam is only 15.5 meters thick. This type of dam saves over half the amount of concrete work involved in building an ordinary gravity dam. Compared to similar types of projects throughout the nation, it used less materials, its construction cost was low, and its design was awarded the national su--rior design award in the 1970s.

The Lishimen Reservor was constructed by the provincial Water Conservancy and Hydroelectric Power Engineering Bureau. During construction, the various technical specifications all reached or surpassed national requirements.

9296
CSO: 4013/19

BRIEFS

CHITAN HYDROPOWER STATION--The Chitan hydropower station has initiated an effort to improve its facilities to ensure safe operation. By the end of October the total power output had reached 470 million kwh, exceeding the annual quota by 70 million kwh. The increase in production and decrease in cost resulted in improved profits. Due to the large number of new employees and defective equipment, there were a number of incidents last year which adversely affected production. Therefore, a program was implemented to strengthen the training of its employees on the one hand, and improve its equipment on the other. One piece of defective equipment was the controllable-silicon magnetizing device; after careful analysis, the circuit was redesigned, and more than 10 technical problems were corrected. In addition, the sealing mechanism of the main axle of the hydraulic turbine was modified to improve reliability of operation. A total of 18 technical innovations were implemented in this facility to improve safety, economy, and to increase power output. The factory often coordinates with the Weather Bureau to take advantage of the flood water during rainy seasons. During the two floods in May and June, taking safety precautions, they increased the amount of water in the reservoir by 130 million cubic meters, which produced an additional 20 million kwh of electricity. Although the annual production quota was exceeded, they continued to strive for higher output so that more energy will be available for industrial and agricultural production; this year's goal is to produce 530 million kwh of electricity. /Text/ /Fuzhou FUJIAN RIBAO in Chiense 20 Nov 82 p 2/ 3012

GUTIAN XI HYDROPOWER STATION--Because of the water shortage this year, the Gutian Xi Hydropower Station initiated a program of regulated water usage. During the first three quarters of the year, enough water was processed to produce 42.44 million kwh of electricity to support industrial and agricultural production. During this year's rainy season, the amount of water available to the Gutian Xi Hydropower Station was considerably less than that of last year. In order to maximize power generation, efforts were made to improve the regulation of water usage. Specifically, the total load in the system network was distributed to the substations so that the generators could operate under conditions of relatively high water levels; also, the water spilled from the 1st cascade station was piped to the 2nd, 3rd, and 4th cascade stations to avoid waste. By obtaining timely hydrological measurements and reports, it was possible to constantly monitor the water situation and regulate the usage accordingly. On the evening of 18 August, there was no

rain at the 1st cascade station, but a downpour occurred upstream of the 2nd cascade reservoir, and the flow rate at the Taoxi station increased drastically. Having obtained a hydrological report from the Taoxi station, comrades in the water regulation office decided to shut down the 1st cascade station and let the 2nd cascade station carry a full load. As a result, the 1.99 million cubic meters of rainwater were completely utilized by the 2nd cascade station, and an additional 610,000 kwh of electricity was generated, which was equivalent to 40,000 yuan of production value. /Text/ /Fuzhou FUJIAN RIBAO in Chinese 20 Nov 82 p 2/ 3012

XIDAYANG HYDROPOWER STATION--After 2 years' work, the No 4 generator of the Xidayang Power Station went into operation on 31 December 1982. The installed capacity of this generator is 3,200 kilowatts, and brings the hydraulic energy utilization rate of this power station up from 70 percent to 84 percent. [Text] [Shijiazhuang HEBEI RIBAO in Chinese 2 Jan 83 p 1]

HAINAN HYDROPOWER STATION--The major portion of the Niululing Hydropower Station has been completed and power is being generated. The Niululing station is located on the middle course of the Wanquan He on the eastern side of Hainan Island and is an important project in the overall development of the Wanquan He river valley. This hydroelectric power station has an installed capacity of 80,000 kilowatts, representing 55 percent of the current total installed capacity of the island. The main part of the project was begun in 1978 and generators 1, 2, and 3 were installed at the end of 1980 and early 1981, after which the station began to generate electricity. The No 4 generator has just been installed. [Text] [Guangzhou NANFANG RIBAO in Chinese 20 Jan 83 p 1]

NANYA HE NO 1 GENERATOR OPERATIONAL--The major part of the work on the Nanya He Hydroelectric Power Station, with an installed capacity of 120,000 kilowatts and the first long-tunnel, water diversion hydropower station on the Nanya He in Shimian County, has been basically completed and the first generator has officially begun to generate electricity. [Text] [Chengdu SICHUAN RIBAO in Chinese 20 Jan 83 p 2]

YUZI XI AHEAD OF SCHEDULE--Work on the Yuzi Xi second cascade hydropower station in Wenchuan County has entered the major construction phase. The 1982 work plan for the water diversion tunnel was completed ahead of schedule. [Text] [Chengdu SICHUAN RIBAO in Chinese 20 Jan 83 p 2]

CSO: 4013/129

ACCELERATED WORK ON POWER PLANTS TO BOOST HEILONGJIANG POWER OUTPUT

Harbin HEILONGJIANG RIBAO in Chinese 2 Nov 82 p 1

[Article by reporters Guo Wenliang [6751 2429 5328], Wang Guangwen [3769 0342 2429], and Zhang Lin [1728 7792]" "Accelerating Energy Development To Meet Economic Development Needs--Installation of No 2 Generator at Fularji No 2 Power Plant Begins"]

[Text] Work on installing the No 2 generator at Fularji No 2 Power Plant is now under way. Both manufacturers of the plant and its installers are working together to employ new techniques and to insure quality standards for a successful initial test run.

This power plant, a major one in the western network, has a total installed capacity of 600,000 kilowatts, represented by three 200,000-kw generators. Production from the No 1 generator started in March of this year. However, because of the poor quality of the equipment and its installtion, over the past half year it has required numerous shutdowns for repairs, resulting in great losses for the state. Before the installation of the No 2 generator, the provincial No 3 Engineering Department's cadres and personnel thoroughly examined the lessons and experiences learned from the installation of the No 1 generator. Based on the production units' suggestions and requirements concerning installation quality, they drafted regulations to assure the quality of installation, implemented technical measures, and trained a corps of technicians. For some crucial equipment and procedures, they added a new individual testing procedure, so that defects can be detected and corrected immediately at various steps of the installation process.

The three Harbin power plants have assigned permanent personnel to the site. On-the-spot checks turned up 14 components that did not meet designed specifications; these were returned to the plants immediately for rectification. Based on problems that arose in the No 1 generator, some irrational structures were modified and new technical facilities bolstered.

It is expected that this generator will begin operations next year.

Mudanjiang No 2 Power Plant, now under construction, will have an installed capacity of 400,000 kilowatts.

The second phase of the construction of Mudanjiang No 2 Power Plant is now in full swing.

Two 200,000-kilowatt generators will be installed during the second stage of construction of this power plant. Ground preparation work began in late May 19[illegible] and although it rained a great deal in July and August, the construction of the main plant buildings, the prefabrication of framework, and the erecting of the three auxiliary power lines continued. Despite hardships, construction workers and cadres worked hard together to overcome difficulties. Every month they completed their assignments ahead of schedule. By 15 October, they had already excavated over 41,000 cubic meters of earth and completed work on the main buildings, the boiler complex, the deoxygenated coal facility [illegible] pouring the concrete columns. In addition, 5.2 meters of the 180-meter-high chimney have also been built. While construction of the main plant buildings was being accelerated, various prefabricated frames, hydrogen stations, [illegible] machine facilities, as well as living quarters and other accommodation for workers were being built. A recent quality (control) inspection by the Provincial Electric Power Bureau on work completed at the job site showed that [illegible] percent of the items inspected achieved excellent quality ratings. These represent the foundation for insuring the high quality of this entire second phase of the construction project.

1127
CSO: 4013/77

SITE PREPARATION FOR HARBIN NO 3 POWER PLANT NOW UNDER WAY

Harbin HEILONGJIANG RIBAO in Chinese 2 Nov 82 p 1

[Article by Zhou Yongjiu [0719 3057 0036] and reporter Gan Fuming [3927 3940 2494]: "Construction of Harbin No 3 Power Plant To Begin Soon"]

[Text] Preparations for construction have just started for the Harbin No 3 Power Plant. The preliminary design has already been approved by the state. The power plant will be built next year along the banks of the Hulan He.

The construction of the power plant will be jointly financed by the state and the local government. The installed capacity of the plant will be 800,000 kilowatts, of which 400,000 kw will be installed in the first phase of the construction in two 200,000-kw generators.

Experts have demonstrated that this power plant, to be built in Hulan, makes sense economically. Its site is right on the Harbin-Suihua Railway Line. Coal from Hegang [7729 1511] can be delivered directly to the power plant without having to cross river bridges. To the south are the Hulan He and the Songhua Jiang with abundant water resources. In addition, next to the river is a vast marshland suitable for disposing of the ash. Moreover, as Hulan is only 20 kilometers from Harbin, electricity can be economically distributed to the city.

The design of the power plant is being undertaken by Changchun Northeast Electric Power Design Institute. Design engineers have tried to incorporate as much new technology as possible in their preliminary designs. Boilers will be built using new compact closed-system technology and tall structures will not be built. Imported boilers, fire extinguishers, and protective equipment will enhance safety. The main machinery of the power plant is to be supplied by the Harbin Boiler Works, the Harbin Steam Turbine plant and the Harbin Electrical Machinery Plant. Technical production agreements for these units have already been signed.

Construction teams from Hulan municipality are now at the plant site and work on workers' quarters, a temporary substation, and water supply projects is now under way.

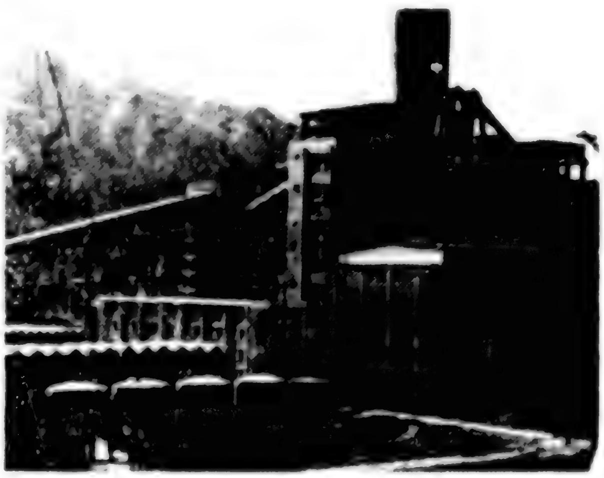
Nevertheless, those responsible for the preparatory work have reported that there are some problems on the site that are keeping the initial work from going into full swing. They hope that the departments concerned both at the provincial and the municipal levels will assist them in solving these problems in land utilization as quickly as possible.

12273
CSO: 4013/77

WORK PROGRESSING ON QINLING THERMAL POWER PLANT

Taiyuan SHANXI RIBAO in Chinese 10 Dec 82 p 4

[Photograph and caption]



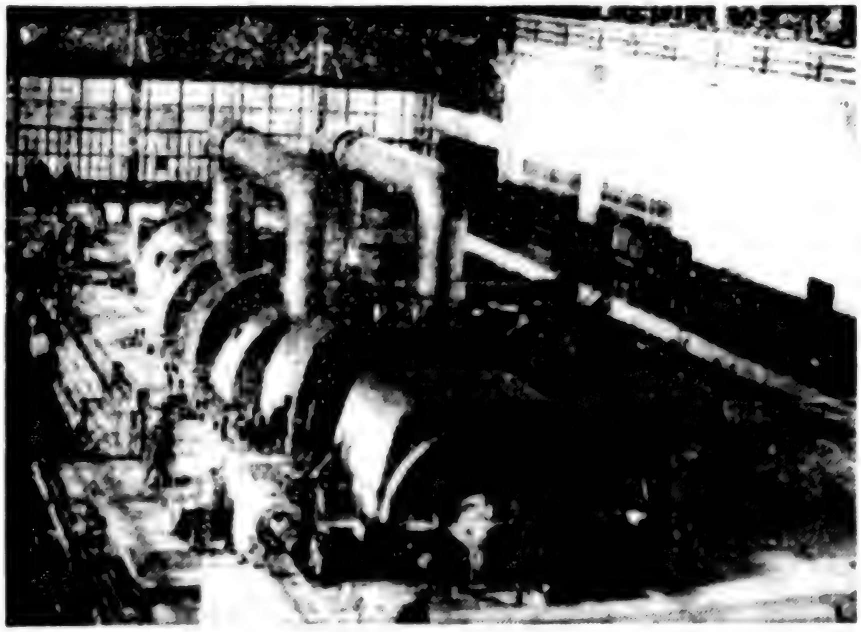
The Qinling Power Plant is located in Shanxi Province's Weibei Coal Fields, a region rich in coal reserves. The second stage of the project has now been basically finished. The plant will have a total installed capacity of 800,000 kilowatts.

CSO: 4013/117

JINZHOU POWER PLANT'S NO 1 GENERATOR PASSES 48-HOUR TRIAL RUN

Shenyang LIAONING RIBAO in Chinese 5 Jan 83 p 1

[Text] On 2 January, the No 1 200,000-kilowatt generator began a 72-hour test run. As of 1830 hrs on the 4th, it had operated without a hitch for the first 48 hours, generating more than 5.9 million kilowatt-hours of electricity. Construction on the plant began in 1979 and the total design installed capacity is 1.2 million kilowatts. It will play a major role in easing problems in the northeast and greatly improve the structure of that grid.



The Jinzhou Power Plant's No 1 200,000-kilowatt generator during its trial run.

CSO: 4013/125

BRIEFS

HUAYINGSHAN POWER PLANT COMPLETED--After trial runs and two full-load tests, the Huayingshan Power Plant's No 4 100,000-kilowatt generator was turned over for operations on 12 November 1982. This power plant has four generators with a total installed capacity of 300,000 kilowatts. In the first stage of construction, two 50,000-kilowatt generators were installed, forllowed by two 100,000-kilowatt generators in the second stage. Both stages were designed by the Southwest Electric Power Design Institute and built by the Sichuan Electric Power Bureau's No 1 Construction Company. The other three generators in operation all started up perfectly on the first run. The completion of the No 4 generator signals the basic completion of this power plant, now the second largest thermal power plant in Sichuan Province. The addition of the new 100,000-kilowatt generator will add about 500 million kilowatt-hours of electricity a year, creating more than 800 million yuan in industrial output, and ease the power shortage in Chongqing and Chuandong Prefecture. [Text] [Chengdu SICHUAN RIBAO in Chinese 3 Jan 83 p 2]

LUOHU PIT-MOUTH POWER PLANT--Work on one of the major construction projects of the 6th Five-year Plan was begun on 11 December in Huainan City, Anhui Province. The Luohe Power Plant is a large-scale pit-mouth power plant with a design installed capacity of 1,200,000 kilowatts. Two 300,000-kilowatt generators will be installed in the first phase of construction, now under way. Building this thermal power plant in the "Liang Huai" coal base makes sense economically and will relieve the pressure on the railroads to ship coal. After the Luohe Power Plant has been completed, it will provide a big boost for industrial and agricultural production throughout all of eastern China. [Text] [Taiyuan SHANXI RIBAO in Chinese 19 Dec 82 p 3]

CSO: 4013/117

COAL

TASKS FOR 20-YEAR DEVELOPMENT OF NATION'S COAL INDUSTRY LAID OUT

Beijing SHIJIE MEITAN JISHU /WORLD COAL TECHNOLOGY/ in Chinese, No 11, 12 Nov 82, pp 2-5, 19

/Article by Zhang Changsong /1728 7022 2646/, deputy chief, Planning Department, Ministry of Coal Industry: "Twenty-year Outlook for China's Coal Industry"/

/Text/ To realize the strategic goal of doubling the total production value of China's industry and agriculture within the next 20 years, we must strengthen the development of energy in a big way and conserve energy consumption. This is a strategic point in China's future economic development. According to our nation's present situation, the most important factor of the energy question is coal. Quickly pushing the development of coal forward is especially important in the progress of the four modernizations.

For 30 years, our nation's coal industry has realized great achievements and has established a good foundation for future development. But we must see that by population, the average level of energy consumption in our nation is still very low. There is a serious waste of energy, the economic benefits in many sectors are very poor, the shortage of energy is still a critical factor limiting economic development. In the next 20 years, efforts to hasten coal development generally must follow two paths to adapt to the strategic distribution of national economic development. During the first 10 years, we must mainly establish the order, the ratio and the foundation, rapidly expand the scale of construction and at the same time seek stable increases in production to realize an output of 800 million tons of coal and to prepare for the economic recovery in the 1990's. During the last 10 years, we must seek a higher rate of development and better economic benefits, strive to reach an output of 1.2 billion tons or more of coal and promote the overall elevation of the socialist economy.

I

In recent years, we have proposed a general guiding thought and a series of principles and policies to hasten the development of our nation's coal industry by summarizing the positive and negative experiences since founding of the nation, by borrowing effective foreign experience and by analyzing the present situation and the developmental trends of our coal industry on an overall basis. All of these have started out mainly from the following basic situations.

First, coal is China's major source of energy. It constitutes 70 percent of the fuel structure. For a long period in the future, this will not change greatly. This is an important decision determined by the situation of our energy resources.

Second, our coal resources are rich, the varieties are complete, but the distribution is uneven. This has already been formed and this will necessarily continue to worsen the situation of shipping northern coal to the south and western coal to the east. This requires us to consider rationally distributing the coal industry and the productive forces of the whole national economy, and to consider the coordinated development of such external conditions as the development of coal and transportation.

Third, coal, compared to oil and gas, has a lower thermal efficiency. In particular, the present coal varieties are singular, and a lot is being directly burned as raw coal. This reduces the utilization of heat energy, affects environmental protection and increases the pressure on transportation. To improve business benefits of coal mining enterprises, the benefits from energy conservation in society and comprehensive economic benefits, we must continue to seek new ways in washing and processing coal, in comprehensive utilization and in changing the structure of the industry and the structure of products.

Fourth, the overall quality of the coal industry is poor. Not only are there defects in the economic management system, but also, the protection technology is backward, and in many sectors the proportional relationship is still not coordinated. This requires us to start out from the long range strategic goal of developing the coal mining industry under the prerequisite of increasing economic benefits on an overall basis, create a comprehensive balance, and establish long-range plans that coincide with the actual situation. We should center efforts around the primary link of expanding the capability in coal production, carry out overall efforts according to plan and step by step, and push forward the overall development of the coal industry.

Fifth, the strategic goal of doubling the output of coal by the end of this century is glorious and difficult. It can be realized with effort. But the period of construction of coal mines is long. Generally it takes 10 years to advance from preliminary preparations to construction, production, and to fulfill the output goal. Therefore, newly built mines must produce results within this century. The key is in the first 10 years. We must fully recognize the importance and urgency of the task facing us.

II

Based on these situations, the development of our nation's coal industry has already entered a new period of change. During this period, whether we can realize a change with a strategic significance will depend on whether we can create a new road and a new situation.

The basic characteristics and demands of this new road, generally speaking, involves the following: First, there must be a relatively [illegible], a gradually rational distribution, a basically coordinated ratio, [illegible] strengthening of the foundation and visible improvement in quality; Second, the growth rate must be more stable; Third, production and construction must be safer; Fourth, technology and management must be more advanced; Fifth, the economic benefits must be better.

Firmly following this road by exerting efforts for the next 10 to 20 years, we will be able to realize five changes in our nation's coal industry: First, key coal mines must change from mainly manual operation to mechanized production and greatly improve their labor production rate. Second, coal mining enterprises must change from singular production and business activities to the production of many types of products and comprehensive business activities, develop towards gasification and liquefaction, and develop joint ventures of coal generated electricity and coalification and other aspects. Third, we must progress from the inability to control the occurrence of major devastating accidents and vocational diseases to basically being able to control them and to fundamentally change the safety situation. Fourth, coal transportation must change from small tonnage trains to large tonnage special trains for transporting coal, from small civilian boats and small ships to barges, from manual loading and unloading to automated loading and unloading, and actively develop the new method of transporting coal by pipelines. Fifth, we must change from purely relying on administrative methods to combining administrative and economic methods to develop coal.

In creating a new way for the coal industry, we must correspondingly implement a series of concrete policies. We must continue to implement the principles of readjustment, rennovation, reorganization and improvement, hasten the speed of readjustment, reorganize the enterprises, implement and perfect various economic responsibility systems, actively and carefully carry out reform of the system and policies so that coal mining enterprises can follow a path of healthy development.

We must combine the distribution of productive forces in the national economy and transportation conditions according the characteristics of the distribution of our nation's coal resources to uniformly plan the key points and the scale of development of uniformly equipped coal mines and local coal mines. While arranging well the key coal producing bases, we must promote provinces deficient in coal to fully utilize local resources, produce and use more local coal, gradually link production, transportation and consumption tightly to realize the rational distribution of the coal industry.

We must place efforts to hasten the development at an important strategic position, expand the scale of construction, hasten the speed of construction, shorten the period of construction. Large mine shafts must be built in stages and must begin production in stages, produce coal earlier and quickly realize the production quotas, and at the same time, we should hurry up and build a number of medium and small mine shafts and quickly develop the gains from investment.

We must implement the principle of equally emphasizing development and conservation, develop washing and processing, and in depth processing and comprehensive utilization in a big way. We must realize "three changes and one development", i.e., change low quality to high quality, change singular product to multiple products, change singular business to diversification, and develop elementary processing into sophisticated processing.

We must grasp technical reform, and develop coal science and technology on a major scale. Mine shafts with favorable conditions should be rebuilt in groups. The potential should be developed. We should grasp key technologies and concentrate strength to overcome difficulties. We should develop general mechanization centered on mining, tunneling and transportation. We should renovate technological processes, technology, equipment, and quickly change the technical situation in the coal industry.

We must insist on implementing the principle of "safety first." We must strengthen safety supervision on an overall basis, exert efforts to improve the means of safety, rely on management, rely on science and the legal system produce coal safely.

We must place education and scientific research in coal at a strategic position. We must strengthen intellectual development on an overall basis, quickly improve the cultural, scientific, technical training of workers. Increase the number and improve the level of specialization of engineers and technical personnel and economic management personnel so that the coal industry can be established on a foundation of science and technology and scientific management.

We must conscientiously implement socialist economic policies, fully mobilize the enthusiasm of each level and the various sectors to build mines, gradually break through regional and professional boundaries, push forward joint efforts between provinces and autonomous regions deficient in coal and coal producing provinces to build mines in a big way, promote joint operations among coal producing enterprises, coal transporting enterprises and coal using enterprises.

We must insist on implementing the open door policy, fully utilize favorable opportunities in the international market, expand exports, import foreign capital, import technology so that our nation's coal industry can quickly catch up with the world's advanced levels.

We must follow the principle of establishing joint efforts among the state, the collective and the individual. While developing production, we should gradually improve the material and cultural life of workers and quickly improve the social image of the coal mines.

III

To realize the goals of the next 20 years in the coal industry, we must firmly grasp five key tasks:

First, we must hasten the development of coal.

[illegible] output of existing productive mines in our nation [illegible] large scale after many years of developing potential, [illegible]. In particular, the eastern coastal region generally [illegible] capabilities and the utilization rate of their designed [illegible] percent. Therefore, in the long range view, increase [illegible] after the "Sixth Five-year Plan" will mainly rely on the [illegible] shafts. Because the construction period of coal mines [illegible] expand the scale of buildup and hasten the speed of building [illegible] as possible starting from now. This is a major strategic [illegible] that the coal industry can develop persistently, steadily and [illegible].

At present, the scale of buildup of mine shafts cannot meet [illegible] development of production. We should guarantee the realization of an annual increase of 20 million tons in output during the "Seventh Five-year Plan" and an annual increase of 30 million tons in output during the "[illegible] Year Plan", and the scale of buildup of new mine shafts by 1985 should [illegible] must be able to produce over 120 million tons, and by 1990, [illegible] should further expand to 170 million to 180 million tons.

The buildup of coal mines in the next 20 years must be based on resources, need, transportation conditions, rational distribution, and efforts to emphasize the key points while taking into consieration the general situation. The mines and the type of shafts must be suited to local circumstances, and large, medium and small mines should be combined. We must build a number of large backbone enterprises, and we must also establish some scattered medium and small mine shafts. While building new shafts, we must fully develop the function of old mining areas as bases. In the type of coal, we must develop coal for power, and anthracite for the chemical industry and for civilian use. Coking coal should be developed according to need and plans.

On the basis of uniform arrangements described above, the coal industry must fully develop the superiority of the resources, and a number of backbone bases and mining areas should be built according to plan and step by step. In the strategic arrangement for the next 20 years, an outstanding point is to develop Shanxi as the center (including the western part of Nei Monggol, western Henan, western Hebei, Shaanxi and Ningxia) of four large expanses including itself, eastern China (Jiangsu, Shandong, Anhui), the northeast (including eastern Nei Monggol) and Guizhou (including Zhen [illegible]). They include 10 large coal bases, 5 open coal mines and several backbone mine shafts. The large expanse centered around Shanxi is an area where our nation's coal resources are most concentrated. The reserves are abundant and the varieties are complete. They are easy to develop and the geographical position is important. By the end of this century, the total scale of buildup can reach 400 million tons to become the largest coal base supporting the whole nation and guaranteeing export. Also, we must correspondingly develop electric power, the chemical industry, metallurgy, the building materials industry, use many means of advanced transportation so that this area will become the nation's largest heavy chemical industry base and become a strong industrial pillar for the building of the four modernizations. Eastern China and northern China rea areas in our nation where the economy is developed the most and energy sources are lacking the most. Guizhou is right next to

Sichuan and south China's areas that lack coal. Strengthening the development of these three large expanses of coal resources will serve a special function in promoting the economic development of our eastern and southern regions. The four large expanses described above have a total known reserve of 597.3 billion tons, about 93 percent of the nation's total. In 1980, they produced 489 million tons, or 78.9 percent. In 1990, they are expected to produce 653 million tons of coal, or 81.6 percent. By the end of this century, this may reach 104 million tons, or 86.7 percent of the national total. Realizing the above goals will improve the distribution of our coal industry and basically solve the energy problem in the six large energy consumption centers of Shanghai-Ningbo-Hangzhou, Liaoning-Jilin, Beijing-Tianjin, Guangdong-Guangxi, Hunan-Hubei, and Sichuan.

In hastening the development of coal on the basis of expanding the scale of buildup and clarifying key points in the buildup, the key problem is how to accelerate the building shafts and shorten the period of construction of shafts. In the next 10 years, we must strictly follow the procedures in capital construction, gradually carry out geological surveys and designing first, make full preparations prior to construction and production, quickly reform the construction management system and implement the economic responsibility system for contracted units carrying out construction on an overall basis, concretely strengthen construction management, shorten the current construction time of 8 years to build a shaft to 6 years, and require that production goals be reached within schedule. During the last 10 years, we should widely utilize advanced construction techniques and strengthen management to further shorten construction time.

Second, We Must Grasp Technical Improvement

While further strengthening management of existing mine shafts and continuing to improve economic benefits, we should continue to grasp technical improvement and fully develop the function of enterprises according to plan and step by step. This is a long range principle to guarantee that the coal industry will develop persistently, steadily and healthily. This is also the main way to increase the output of coal in the near term. This is because we must still mainly rely on existing productive shafts to increase the productive capability by implementing technical improvements in the near term, and more importantly, our nation's coal mines are basically still "small (the types of shafts are small), scattered (production is scattered), dense (the density of coal mining shafts in coal fields is high), the degree of mechanization is low (in 1981, the degree of mechanization of coal mining at uniformly equipped mines was less than 40 percent, the degree of mechanization of local coal mines is even lower), the technology and techniques are backward, safety facilities are deficient, many mining shafts overproduce, their coaling, storage, transport systems and welfare facilities are not complete. They have affected the development of the capabilities of the mining shafts. If we cannot carry out technical improvement in a key way and step by step, then after many years, the situation of enterprises will not change, the techniques, the technology and production will be the same, economic benefits will not improve, and there would be no hope. The new shafts that being production in the future will also encounter problems of continuous rebuilding and

improvement [illegible] development [illegible] during the next [illegible] years is to greatly [illegible] tunneling and transportation, to renovate backward technology [illegible] equipment, to improve safety measures, and to correspondingly [illegible] production of [illegible], and we must especially continue [illegible] mining shafts that have good resources to expand their [illegible] through improvements. In the "Sixth Five-year Plan", [illegible] the improvement of 145 mining shafts. By 1985, they [illegible] more than [illegible] million tons so that the output [illegible] 300 million tons. During the "Seventh Five-year Plan" and [illegible] this century, this level must be maintained. We must [illegible] research to overcome difficulties and technical improvements. [illegible] scope of technical improvements and the key points in technical [illegible], and grasp them according to plan and with established goals.

Third, We Must Develop Local Coal Mines on a Major Scale

Local coal mines are an important component of our nation's coal industry. In 1981, they produced 286 million tons of coal, constituting 46 percent of the total output of raw coal throughout the nation. The development of local coal mines is serving a more and more important function in fully utilizing local resources, improving the level of self-sufficiency in coal in the regions, promoting and enlivening the local economy, reducing the state's energy burden, and promoting our building of the "four modernizations".

Over the past 33 years since founding of the nation, output of local coal mines increased 31 times and great achievements and rich experience have been obtained. But during those years, many problems have accumulated. They mainly include a lack of reserve resources, serious deficits accumulated by the enterprises, poor equipment, poor safety conditions, lack of connection between production, supply and marketing, and unsuitable managerial agencies. As long as we address our efforts at the problems, concretely grasp all work, strengthen improvement on the basis of consolidating existing bases, hasten development, the local coal mines will be able to open up a new way and make new contributions, and this year's output can break the mark of 300 million tons, and by 1985, output can reach 330 to 340 million tons, and by 1990, it can reach 400 million tons. By the end of this century, we should strive to reach 600 million tons.

The key in realizing the above goals by local coal mines is policy. We must concretely implement the four policies decided by the State Council, to subsidize loss incurred by local coal mines, to appropriately reduce taxes, to increase investment in capital construction and to increase capital for technical improvements, and to increase maintenance funds. Efforts to transfer and use local coal should be given price incentives, and we should allow a definite amount of coal for sale by the locality itself at floating prices to further mobilize the enthusiasm of local levels to develop coal mining. In addition, we must complete the task of readjustment, strengthen geological surveys, establish development funds, carry out technical improvements well, hasten the buildup of new shafts, reorganize enterprises well, strengthen management on an overall basis, reform the system, strengthen leadership, let

the coal profession uniformly manage production, supply and marketing, continue to implement the principle of "support, reorganization, improvement, unity" at commune and brigade coal mines, insist on uniform planning, prevent unplanned mining and excavation and destruction of resources.

Fourth, We Must Exert Efforts To Develop Coal Washing and Processing and Comprehensive Utilization

Developing coal washing and processing and comprehensive utilization on a large scale is the main measure to improve the product structure, the economic benefits of coal and the benefits of energy conservation and to enliven the coal industry.

Today, the percentage of washed coal and the degree of processing in our nation are all very low. The percentage of raw coal being washed throughout the nation is less than 20 percent. It is only 34 percent at coal mines uniformly equipped by the state. Processing of formed coal and coal gasification have just begun. Liquefaction of coal is still in the research stage. Because the degree of processing is low, we cannot supply coal that is perfectly suited to all the requirements of users. The rate of utilization of thermal energy is low. These have correspondingly worsened the energy shortage. The economic benefits of the enterprises are poor, and at the same time, massive problems in environmental pollution have been brought about.

In the future, coal washing plants must be built along with mining shafts (open mines). Existing producing mines that do not have coal washing plants or have insufficient capabilities must also gradually add coal washing plants or expand such plants according to need. Those mines that do not need to build coal washing plants must also complete the screening system. It is expected that during the next 10 years, newly added coal washing capability will reach 150 million tons. Thus, by 1990, the percentage of washing raw coal produced by the mines uniformly equipped will increase from the present 34 percent to over 50 percent. Commercial coal ash will also correspondingly drop and we can basically supply suitable coal products. The state's uniformly equipped coal mines will not have to directly market raw coal anymore.

At the same time, we must greatly develop formed coal processing mainly of honeycomb coal for civilian use, coal briquets, formed coal for locomotives, gasify the cities in 12 mining areas, actively develop technical research in coal liquefaction. We must fully utilize poor quality coal and low thermal value fuel and actively develop coal mines to generate electricity. Coal regions with favorable conditions must all gradually build small private power plants. In the comprehensive utilization of by-products of coal mines and low thermal value fuel, we must actively develop the production of fuel for power, building materials, and chemical industry products according to the principle of technical feasibility, economic rationality and the satisfaction of requirements for environmental protection. By 1990, we expect to be basically self-sufficient in building materials for coal mines. In addition, we must gradually develop environmental protection monitoring, scientific research, and protect the environment in mining areas and people's health.

Fifth, We Must Concretely Strengthen Scientific Research [illegible] Science

To basically change the backward situation in the coal industry [illegible] the quality of the coal industry during the next 20 years, we must concretely strengthen scientific research, education and training.

Scientific research in coal must quickly strengthen its own buildup, [illegible] research capabilities, expand the scope of scientific research, [illegible] quality of scientific research, hasten the period of scientific research, [illegible] the promotion of the buildup of coal production as the foremost [illegible] must take learning, digestion and absorption of foreign scientific [illegible] achievements as an important way to develop scientific research in [illegible] basis of self-reliance. We must allow scientific research to conscientiously produce high quality achievements persistently and train talent. The entire scientific research work must center around modernized comprehensive surveying, specialized drilling, quick tunneling, mechanized coal mining, preventive techniques for safety, washing, comprehensive utilization, renovation of supports in mining shafts, mining open pits, pipeline transport and coal gasification and liquefaction and such major topics, and urge the coal industry to realize major technical changes.

The task of education and training is to gradually establish a more complete educational system in the coal industry within the next 10 years so that high schools, middle vocational schools, technical schools, vocational middle schools, cadres schools and workers' training bases in the mining regions can be rationally distributed. Their ratios should be coordinated so that specialization and the types of jobs can be matched and so that they can basically adapt to the needs in the development of the coal industry and train a sufficient number of specialized technical and managerial talent. We should strive to increase the current percentage of 1.9 percent of engineers and technical personnel in the coal industry system to 4 percent within 10 years. We should train workers and cadres on a rotation basis broadly, [illegible] the level of science, technology and industrial management of the workers and adapt to the requirements for modernization in the coal industry.

The coal industry has already manifested its limitless, broad and bright future. As long as we lift up our spirits and work hard under the guidance of the spirit of the 12th Party Congress, we will surely be able to complete the glorious task facing us, that is, to create an overall new situation.

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NEW WAYS TO DIVERSIFY COAL PROCESSING, UTILIZATION DISCUSSED

Beijing MEIKUANG GONGREN [COAL MINER] in Chinese, No 12, 1982 pp 3-5

[Article: "New Ways To Diversify Coal Processing, Utilization"]

[Text] Popularizing the Fluidized-Bed Boiler

The fluidized-bed boiler is a new type of boiler which is fired by low thermal value fuel and which conserves superior quality coal. Since the third Plenum of the 11th Party Congress, efforts by the departments in the coal industry to rebuild boilers progressed greatly. By the end of 1981, the nation's uniformly equipped coal mines already rebuilt 530 fluidized-bed boilers that produced 3,550 tons of steam, constituting 27 percent of the total amount of steam generated by the boilers. This constituted an increase of 275 boilers and 1933 tons of steam over 1978. Each year, the fluidized-bed boilers fire over 2,500,000 tons of waste coal rocks and low quality coal and conserve more than 1,000,000 tons of coal. The capacity of the boilers includes 0.5T/H to 20T/H heating boilers and also 27T/H to 130T/H large power generating boilers.

The double chamber fluidized-bed boilers test manufactured in Zhejiang fire 1,000-kilocaloric bone coal. Thermal efficiency can reach 70 percent. The fluidized-bed boiler firing lignite in Jilin has a thermal efficiency above 80 percent. The fluidized-bed boiler fires waste coal rock of about 2,500 kilocalories. Compared to boilers firing superior quality coal, the cost per ton of steam can be reduced by 2 to 3 yuan. The Beipiao Mining Bureau uses a fluidized-bed boiler for centralized heating. Compared to the stratified boiler which fires superior quality coal for scattered heating, centralized heating can conserve more than 100,000 yuan during one heating season, a conservation rate of 44.2 percent. The Jilin Yingcheng Coal Mine has used a fluidized-bed boiler for 10 years and it has conserved a total of 2,130,000 yuan in capital.

Development of Waste Rock as a Building Material

Since the Third Plenum of the 11th Party Congress, the nation's coal mines have realized visible results in utilizing waste rock to produce building materials. By the end of 1981, a total of 160 waste rock brick plants had been built with

[illegible] productive capability of 1.7 billion bricks. [illegible] plants over 1978 which had a productive capability of [illegible]. Thirty-one waste rock cement plants have been built with [illegible] of 305,000 tons, an increase of 16 plants over 1978 with a productive capability of [illegible] tons. Each year, they utilized a total of 4,650,[illegible] tons of waste [illegible] rock and conserved 250,000 tons of coal.

Progress in the utilization of bone coal has also been fast. [illegible] bone coal fired brick factories have been built with a productive capability of 1 billion bricks. Sixty bone coal-fired cement plants have been built with productive capability of 700,000 tons. Each year they utilize [illegible] of bone coal and conserve 200,000 tons of coal.

The quality of waste rock bricks is generally above grade 100. The cost of each brick is generally lower than 4 fen and some bricks cost about [illegible]. The average profit per brick is over 1 fen. Waste rock cement generally stabilizes at above grade 325 in quality, and some can reach grade 425. The average per ton profit is about 10 yuan. The waste rock bricks produced by the Changchang Coal Mine on Hainan Island are exported to Singapore. The waste rock bricks produced by the Jiaozuo, Yongrong, Beipiao, Pingzhuang bureaus satisfy their own use and are also exported to other provinces and cities.

Utilization of Low Thermal Value Fuel To Generate Electricity

Since 1978, the coal system has rebuilt and newly built five electric power plants fired by low thermal value fuel. The installed capacity is 77,500 kilowatts. After all of them begin production, they can conserve 230,000 tons of coal a year.

The Yongrong in-house power plant originally fired superior quality coal and suffered deficits year after year. Now it has been rebuilt into 4 fluidized-bed boilers generating 69 tons of steam. The installed capacity is 9,500 kilowatts. The boilers are fired by washed waste coal rocks and boiler coal [illegible] from medium grade coal. The cost of generating electricity dropped from the original 0.116 yuan per kilowatt-hour to 0.05 yuan. The profit over 6 years totaled more than 8,800,000 yuan and more than 200,000 tons of superior quality coal were conserved. The newly built waste rock power plant in Pingxiang has an installed capacity of 6,000 kilowatts. The two 35T/H fluidized-bed boilers were all designed and built by the plant itself. The first generator joined the network and began generating electricity at the beginning of this year. It has operated cumulatively for 1,691 hours and has generated [illegible],260,000 kilowatt-hours of electricity. The plant fires mixed waste rock with a thermal value of 2,300 kilocalories. The consumption of standard coal per kilowatt-hour is 0.7 kilograms, and the cost per kilowatt-hour of electricity is about 5 fen. The investment in building the plant was less than that of similar types of power plants by nearly 1 million yuan.

The Development of Formed Coal for Locomotives

China's steam locomotives used to fire raw coal. Coal was wasted from top to bottom. The thermal efficiency was low and waste was large. According to surveys, the average thermal efficiency was only 6 to 8 percent. Flyash alone reached over 20 percent. To solve this problem, the coal ministry organized the Tangshan Coal Research Institute to produce formed coal for locomotives and it was tested on locomotives at the railroad service sections at Guye and Sanjiarfang. In 1980, the Ministry of Coal Industry, the Ministry of Railways and Beijing City jointly test manufactured 6,000 tons of formed coal. The coal was test fired for 4 months by the Beijing Railroad Administration and tested on the circular experimental railroad line at the Research Institute of the Ministry of Railways. The results showed that it conserved 19 to 26 percent of coal, improved output of the locomotive by about 18 percent, reduced labor intensity of the boiler engineer by 25 percent, and it was beneficial to eliminating smoke, dust and pollution.

Now, a more mature experience in the techniques for producing formed coal for locomotives has been acquired, and we can now manufacture complete facilities to produce 100,000 tons of formed coal annually. The Beijing Mining Bureau has built a production line with an annual capacity of 20,000 tons of formed coal for locomotives and it has already officially began production.

Test Manufacturing of Top-Ignited Honeycomb Coal

The Tangshan Coal Research Institute, the Beijing Mining Bureau and the China Coal Institute acquired foreign experience and test manufactured the top ignited honeycomb coal. This type of honeycomb coal ignites easily, burns quickly, the fire is strong, and its thermal efficiency can reach 45 percent. It can conserve 15 percent compared to the amount of ordinary honeycomb coal, and it can conserve 40 percent compared to the amount required in firing bituminous coal (raw coal). At the same time, it can reduce pollution, and the amount of harmful gases released is 70 percent less than that released by ordinary honeycomb coal.

The cost of producing top ignited honeycomb coal with 750 grams of ignition agent is about 5 fen. The production cost of honeycomb coal without any ignition agent is about 4 fen (the cost of ordinary honeycomb coal per briquet is 2 fen 4 li).

Although the cost is about 2 fen higher than that of ordinary honeycomb coal, but because of the high thermal efficiency, the daily cost of coal of the users is about the same. At present, we are test manufacturing cheap oxidizing agents and this will further reduce the cost of honeycomb coal.

The production of top ignited honeycomb coal requires the addition of two production procedures of mixing and drying compared to the production of ordinary honeycomb coal. The shaping technology requirement is higher, but the production technologies are not complicated and such coal can be mass produced. At present, four production lines at Beijing, Huainan, Fengfeng and Fushun have been built. The whole nation has progressed from the experimental stage to the test firing stage.

[illegible] of Coal Washing and Coal Quality

Since 1978, new progress has been made in coal washing and coal quality [illegible].

I. [illegible] quality has been improved. The ash content of commercial coal [illegible] in 1981 by the nation's uniformly equipped mines was 21.[illegible] percent, [illegible] 1.73 percent from that in 1978. Thirty-five bureaus elevated the grade [illegible] of coal. [illegible] percentage of waste rock dropped to [illegible] [illegible] lowest levels in the past and consecutively for 2 years. In 1981, the ash content of washed coal concentrate registered a drop of 0.14 percent from that specified in the product catalog while washed coal concentrate [illegible] [illegible] the plans year after year. There were 23 coal washing plants [illegible] elevated their grades of coal and 42 plants produced many varieties. The [illegible] products produced by the Zhuzhou, Longfeng, Benxi, Linxi, and Laohutai plants were evaluated as superior quality products by the ministry. The first grade coal concentrate of Zhuzhou, the second grade coal concentrate of Longfeng and the washed medium lumps of Laohutai all received silver medal awards from the State.

II. Coal washing ability was strengthened. Over the past 2 years, about 10,000,000 tons in the capability for washing raw coal were added each year. By 1981, there were 39 coal washing plants with annual designed capacity of [illegible],950,000 tons, an increase of 5 times from the beginning period of the [illegible] of the nation.

[illegible]. The level of management has been improved. The coal washing plants strengthened quality control in the course of production and made breakthroughs in reducing ash content, water content and in strengthening coal mud water management. The mine shafts mainly grasped quality control of work procedures for the faces. They used the quality of work procedures to guarantee product quality and safe production.

I[illegible]. Experiments and popularization of new techniques were carried out. At present, 20 plants have realized closed circuit cycling of washing water. The inclined trough separator and selector, the ore pulp preparator, the storage welding screen and the water film dust collector have been test manufactured [illegible] fully. The experimental work in the probability sieve and the belt type press filter has made definite progress.

Research in the Gasification and Liquefaction of Coal Has Begun

[illegible] coal gasification surrounding the urgent need for our nation [illegible] developing coal gas in the cities, the Beijing Coal Chemistry Research Institute has actively developed the study of techniques of coal gasification. In recent years, we have built experimental facilities and laboratories for pressurized gasification. Small intermediate experimental furnaces for pressurized gasification of solid slag have been designed and are now being manufactured. Their installation is expected during the first quarter of next year. The new technology of gasification emphasizes the study of pressurized gasification and catalytic gasification techniques of liquid slag. The pressurized gasification

furnace for liquid slag has already been designed and is being manufactured. Next year it can begin experiments. In catalytic gasification, experiments to select the catalysts have been done on small experimental equipment in the laboratory. Preliminary results were good.

In coal liquefaction, efforts over the past 3 years have concentrated on establishing research and experimental conditions and strengthening the build-up of the work team. At the same time, fundamental research has been launched. The Beijing Coal Chemistry Institute utilized a high pressure cauldron to study liquefaction properties of over 20 types of lignite and high sulfur coal of our nation. Experimental results show that our nation's lignite generally has a good property for liquefaction. The newly built liquefaction laboratory has completed its civil engineering construction in May of this year. The analytical equipment needed has mostly been assembled. The two sets of small experimental facilities that can conduct continuous experiments in coal liquefaction are being installed and tests can start at the beginning of next year.

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COAL

COAL SECTOR PROMOTES FOREIGN TECHNICAL, LOAN AGREEMENTS

Beijing MEIKUANG GONGREN [COAL MINER] in Chinese, No 12, 1982 pp 5-6

[Article: "Creating a New Situation in International Relations for the Coal Industry"]

[Text] Developing Technical Exchange

In recent years, there have been more activities to open up technical exchange between China and other nations and to participate in international conferences. In 1980 and 1981 alone, a total of 136 persons were sent abroad in 35 groups to observe, pursue advanced studies and participate in joint research teams. A total of 105 people went in 36 groups to participate in international academic conferences, and 235 people in 61 groups came to China to observe, attend academic exchanges and to lecture. There were also many other people who went abroad to study and receive training via trade relations. With the above activities, we learned some advanced technology and understood the international trend in the development of the coal industry. Some new techniques have already been used and popularized domestically and good results have been realized. For example, in the design of large mine shafts, in the comprehensive control of water in coal fields, in the construction of shafts, in the methods of mining coal, in supporting tunnels, in safe production at coal mines, in geological surveying, in the management of coal mines and in manufacturing coal mining equipment. Some problems that urgently need to be solved, such as pipeline transport of coal slurry, have been investigated and studied and cooperative ways have been sought. Joint research agreements have been signed with Japan, the United States and West Germany to realize some long-range goals such as coal liquefaction technology. We have invited experts and scholars to lecture on impact pressure in coal mines and the handling of hard support plates in mines, the handling of broken support plates, and systems engineering. The lectures have served to promote basic theoretical research and improve the teaching standard at coal universities and colleges, and some coal institutes and schools have established intercollegiate liaison with their counterparts in foreign universities and research units.

In international relations, the achievements of our coal industry have been made known, we have made many friends, promoted friendly ties between ourselves and the governments and peoples of some major coal producing nations,

thereby raising our international status. In 1980 and 1981 alone, our scholars and experts presented nearly 40 papers at international academic conferences related to the coal industry. Most papers were of a high standard and were noted and praised by delegates attending the conferences. Certain techniques of our coal industry, such as hydraulic mining, rank among the advanced levels of the world. Some nations hope we can provide them with such technology. In particular, our experience in developing the coal industry has its own characteristics and it is noted by Third World nations.

We have also more satisfactorily held two international conferences. One was the first international mine planning and development technology discussion conference in Beijing and Beidaihe in September 1980, jointly sponsored by the China Coal Society, the China Metals Society and Philomen Press [?] of the U.S. The other was the 48th meeting of the International Organization Committee of the World Mining Association sponsored by the China National Mining Committee in Beijing in May 1981. The sponsoring of these two international conferences promoted friendship and exchanged scholarship. Many foreign friends gained a better understanding of socialist China. They said: "China has a glorious past, and it will surely have a glorious future."

Introduction of Advanced Technical Equipment

Since 1978, the state has approved our ministry to continue to import large amounts of more advanced equipment and instruments for surveying, construction, production and scientific research and education. They have directly served to promote the modernization of the coal industry and strengthen our self-reliance. In 1978, our ministry imported 100 sets of comprehensive mechanized mining equipment and the complete facility for the Fangezhuang Coal Washing Plant at Kailuan Mines. Later, we continued to import the complete set of equipment for the Xinglongzhuang Coal Washing Plant at Yanzhou, the circular chain production line of the machinery plant of the Zhangjiakou Coal Mine, the hydraulic components shop of the Xuzhou Hydraulic Prop Plant, the packaging plant for rapid packaging of liquid gel explosives of the Huaibei 910 Plant and its technical patent. These important technologies have visibly improved production at the coal mines and the means of production, such as the 100 sets of comprehensive mining equipment, which have developed an important function in recent years. Their economic benefits are outstanding. The workers are safe while engaging in production in the mine shafts. The equipment has been universally welcomed by the workers. According to statistics, there are now more than 140 coal faces throughout the nation that are using comprehensive mining equipment. The output constitutes over 19 percent of the output of uniformly equipped coal mines. The mining efficiency of the faces reached an average of over 13 tons per worker, and the annual output of the faces averaged 400,000 tons. The efficiency of the faces of the comprehensive mining team of the Tongjialiang Mine of the Datong Mining Bureau which has utilized the comprehensive mining equipment better has reached 40 tons per worker and annual output has reached 1,040,000 tons (1981). Now, our nation can manufacture comprehensive mining equipment suitable for some coal seams by ourselves. Liquid gel explosive is a new foreign technology and new product. It is safe and reliable. The imported liquid gel explosives quick packaging plant and

technical patent did not require a lot of foreign [illegible], [illegible] filled a blank. Official production began in February of [illegible]. [illegible] can produce 6,000 tons a year. The Zhangjiakou Coal Mining Machinery Plant used imported equipment to produce ring chains. The quality has reached the level of similar foreign products and the quantity can supply the domestic market, and this year, the product will be exported to the United States for the first time.

Utilization of Foreign Capital

In recent years, we took the utilization of foreign capital to [illegible] the development of our nation's coal resources as a major goal and we have realized preliminary results. They include the following:

On 5 September 1979, the Chinese government and the government of Romania signed a cooperative agreement for compensatory trade to build a coking coal mine in Huo County, Shanxi Province. The Romanians will use export credit loans to provide equipment and technology. After the mine has been built, coal will be exported as compensation. The first phase of construction involves building the Bailong mine shaft and coal washing plant. The cooperative effort is proceeding smoothly.

We have used energy loans from Japan to build seven mine shafts at Qianjiaying, Baodian, Jiangzhuang, and Xiqu. The total scale of construction will be a facility with an annual output of 21,000,000 tons of raw coal. Some projects are under construction and some are being prepared.

On 15 May 1982, the China Coal Development Company and the Paris Development and Export Company of France signed an agreement to utilize French export credit loans to import from France key equipment for the Dongtan Coal Mine in the Yanzhou Mining Area, Shandong Province. When the mine is built, the coal produced will be shipped to France as compensation

On 25 March 1982, the China Coal Development Company and the Daoxi Coal Company of the Western Petroleum Corporation signed a joint agreement to make a feasibility report for the development of the open coal mines at Antaibao in the Pingshuo Mining Area, Shanxi Province. For 2 years, both parties have conducted many negotiating sessions concerning joint investment and construction of the Antaibao open coal mines. Both parties honestly want to cooperate and work is being intensively carried out. It is planned that after completion of the mine, the annual output of raw coal will be 15,000,000 tons. This is the first coal mine to be operated with joint foreign and domestic capital.

On 2 November 1981, the China Coal Development Company and Tenshin Boeki Koshi of Japan signed an agreement. The [Japanese] Company will provide 1 billion yen in favorable free loans to the China Coal Development Company. The China Coal Development Company will export coal as repayment for the capital loan and interest over 5 years.

In recent years, we have done a lot of work in using foreign capital to develop coal and to develop economic and technical cooperation. The above projects are only a part of such efforts. There is another group of projects being negotiated with foreign companies and with the World Bank. The work in this respect has already opened up the situation, experience has been explored, and a corps of cadres has been trained. They have established a good foundation for future work.

The Development of Other Ways of Economic and Technical Cooperation

We have insisted on the principle of equality and mutual benefit in developing economic and technical cooperation. We have used many versatile ways to realize cooperation. For example, we cooperated with the Komatsu Manufacturing Company of Japan. Komatsu Manufacturing Company demonstrated a small complete set of equipment for open coal mines at the old pit of the open coal mine east of Fushun. The Komatsu Manufacturing Company provided the equipment, technical service, and a portion of the cost. We provided the site, accessory construction and a part of the cost. This cooperative effort was conducted in 1980. The equipment was installed that year, and production began that year, and the demonstration ended that year. The project excavated 160,000 tons of residual coal and refilled more than 800,000 cubic meters of old pits. We realized economic benefits and purchased the equipment cheaply without spending a cent of state funds. We also trained more than 100 technical personnel, managerial personnel, equipment operating and maintenance personnel, and we received nearly 3000 visitors who saw the superiority of the technology of using the single dipper trolley and vehicles to mine open coal pits.

In addition, we also cooperated with Japan and West Germany with assistance from the International Development Association of the United Nations to conduct research in coal liquefaction techniques and we cooperated with Japan to prospect the Liuzhuang Mining Area in the Huainan Coal Fields. These projects are all in progress.

Development of Coal Exports

In recent years, the export of coal has steadily increased. Our nation's coal has preliminarily entered the international market. In 1978, we exported 3,120,000 tons of coal. In 1981, we exported 6,670,000 tons, an increase of 113.8 percent over 1978. To combine industry and trade and to unify production and marketing, the State Council approved the transfer of management authority of coal exports from the economic and trade ministry to the coal ministry starting from July, 1982. This will help develop coal exports. By 1985, the Qinhuangdao Harbor rebuilding project will be completed as will the Shijiusuo Harbor and related railroad construction. Coal exports will realize even greater development.

While developing coal exports, we have actively developed exports of electromechanical products for coal mines and comprehensive utilization products, test marketed a number of products, and initially opened up some export channels.

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CSO: 4013/86

RAPIDLY GROWING LOCAL MINES ARE VITAL PART OF NATION'S COAL INDUSTRY

Beijing SHIJIE MEITAN JISHU /WORLD COAL TECHNOLOGY/ in Chinese, No 11, 12 Nov 82, pp 6-7

/Article by Yang Yongren /2799 3057 0088/ and Du Zhenbiao /2629 2182 2871/, coal mining engineers of the Planning Department, Ministry of Coal Industry: "China's Local Coal Mines Develop Rapidly"/

/Text/ China's local coal mines include state-run mines in the provinces (autonomous regions), prefectures (cities) and counties, and county, commune and brigade coal mines under the collective ownership system. They have developed rapidly under the guidance of the local government at each level and with support from the state. In 1981, they actually produced 286.58 million tons of raw coal (of this amount, state-run coal mines above the county level produced 160 million tons, and the coal mines of the collective ownership system produced 126.58 million tons), constituting 46 percent of the total output of coal of the whole nation, and registering an increase of more than 31 times over the annual output of 8.9 million tons in 1949. Between January and August of this year, they actually produced 192.65 million tons of raw coal, a surplus of 20 million tons over the same period last year. According to recent efforts that were implemented, this year they are expected to produce 300 million tons. They have already become an important component in China's coal industry.

I

The development of China's local coal mines has manifested a more and more visible function in the national economy, mainly in the following aspects:

A. There Are Many Points and the Scope Is Broad, They Are Favorable to Improving the Distribution of the Coal Industry and Improving the Level of Regional Self-sufficiency

At the end of 1981, there were 18,523 local coal mines throughout the nation. Among them were 2,455 state-run coal mines above the county level and 16,068 coal mines under the collective ownership system. Among the local state-run coal mines, 1,697 mines had an annual output of over 30,000 tons. The verified annual design capability was 178.81 million tons. The distribution of these coal mines extended from the southeast coastal area to the northwest plateau,

and from the southwest mountain regions to the northeast border. Of the 1,060 counties that have coal resources, 1,031 have working mines. There are another 161 counties that do not have resources but have gone to neighboring counties to operate mines. In the nine provinces (autonomous regions) south of the Chang Jiang where industrial and agricultural production are relatively developed and where there is a serious shortage of fuel, 325 counties have working mines. Among them, 116 counties produce over 50,000 tons annually. In 1981, they produced 54.96 million tons of coal. Hunan and Jiangxi are already basically self-sufficient in coal. In the remaining 7 provinces (autonomous regions), the self-sufficiency level in using local coal has also improved to varying degrees.

B. Combining medium and small enterprises; small enterprises are the key, fully utilizing coal resources.

Most local coal mines throughout the nation developed from small mines to large mines gradually by suiting measures to local conditions. They can zone large coal fields for mining and suit measures to local conditions to mine medium and small areas. They can also mine tectonically destroyed zones or leftover coal columns that could not be worked in large mines. According to statistics for Shanxi, Henan and Shandong, local coal mines that mine unrecorded reserves and leftover coal columns constitute 72 percent. Most local coal mines south of the Chang Jiang utilize medium and small resources where large mines cannot be built.

C. Nearby Production, Local Utilization Stimulate the Local Economy

Most local coal mines throughout the nation carry out production nearby and the output is utilized locally. This effectively promotes the development of local industry and commune and brigade enterprises. The supply of raw material fuel and coal for local industry and collective industries in towns throughout the nation mainly comes for local coal mines.

According to preliminary investigation, an average utilization of 60,000 to 100,000 tons of coal will create a production value of 100 million yuan. The whole nation's commune and brigade enterprises use self-produced coal to fire brick and tile. The annual output is 140 billion pieces, constituting 70 percent of the total national output of brick and tile. The annual output of caustic lime was 35 million tons, or 90 percent of total national output of lime.

In addition, coal mines run by commune brigades produce and use the coal themselves. In recent years, these mines provided an average of more than 20 million tons of coal for civilian use in farm villages each year. The amount can be substituted for more than 40 million tons of biological products and has made it possible to return stalks and stems to the fields and they in turn are equal to over 80 billion jin of organic fertilizer. The mountains, forests and grasslands have been protected and this benefits the protection of the ecological balance.

D. The Pressure on Uniformly Equipped Mines [illegible] Been Reduced

The development of the local coal industry not only [illegible] coal supply for local industrial production in the pr[illegible] regions) and for living needs of town residents, key [illegible] can also provide some commercial coal for the state to supplement the deficiency in the output of coal by uniformly equipped mines. In [illegible], the [illegible] over 30 million tons of local coal. This greatly reduced [illegible] uniformly equipped mines. At the same time, the mine shafts [illegible] are small, investment is less, and results are quick. According to statistics, during the 10 years from 1971 to 1980, 454 pairs of mine shafts were built and began operation with a capacity of 61.2 million tons. State capital subsidies amounted to 2.876 billion yuan, an investment of 47 yuan per ton of coal. During this period, the mine shafts had already produced a net increase of 58 million tons in output. The mines run collectively by the communes and brigades are self-reliant. First, they do not use state investment, and second, they do not increase the number of people consuming commercial food grains. This is one thing that can produce many benefits in utilizing local resources, increasing the output of coal and making the communes [illegible] the collective rich.

II

There are three main experiences in the rapid development of local coal mines in China:

A. Insisting on the Policy of Walking "On Two Legs"

Since founding of the nation, the development of the coal industry started out from the actual situation, insisted on walking "on two legs", and the policy of simultaneously building mines by the central government and by the localities was implemented. Under the guidance of state plans, uniformly equipped coal mines were built at key points, and on the other hand, local coal mines were actively supported and developed. In building mines at the localities, state-run coal mines were developed on the one hand and on the other hand, mines operated collectively by the people's communes were also supported. Because of the enthusiasm of both the central authority and the localities, the rate of development was very fast.

B. Insisting on Carrying Out Technical Improvement

Most local coal mines have been established by self-reliance. Because of insufficient capital, the mines began very simply. Starting in 1972, the state allocated special steel and equipment. Starting from 1974, the state appropriated special funds to help local mines carry out technical improvement. The best sites were selected for improvement, and by the end of 1981, 1,049 local and county mines had been improved. Before improvements, the output was 28.53 million tons. After improvements, the output was 74.52 million tons, a net gain of 45.99 million tons. The improvements cumulatively utilized 1.04 billion yuan in state subsidies. Practice proves this is a way to develop th potential to increase output without requiring a lot of money and a way that can produce quick results.

C. Implementing Correct Economic Policies

Because historically the price of coal has been low, and because the price of local coal is also lower than the price of coal of uniformly equipped coal mines, in the near term, it is difficult to adjust the price to a reasonable level. Therefore, most coal mines have suffered losses for long periods, and as mining deepens, as cost increases, some mines could not operate anymore. The state has taken measures to provide technology, capital and materials and has actively supported the coal mines, and it has also implemented protective economic policies. The state has also established concrete regulations regarding subsidies for loss, reduction or exemption of taxes and requests for funds for maintenance. These have served greatly to consolidate local coal mines.

To mobilize the enthusiasm of the localities to develop mines, the policy of giving extra subsidies to localities exporting coal was implemented. For example, since Shanxi province implemented the policy of giving extra subsidies for commercial coal shipped elsewhere beginning in 1979, the local coal mines produced an annual average increase of 8 million to 10 million tons.

III

Based on the spirit of creating a new situation and the demand to realize major development and changes in the coal industry proposed by the 12th Party Congress, the general task of China's local coal mines over a definite period in the future is to hasten improvement, hasten development, follow a new road and make new contributions on the basis of consolidating the present position. Starting from 1983, an average annual growth of 10 million to 12 million tons should be realized. By 1990, the annual output should reach over 400 million tons. Safe production must be visibly improved. The situation of the mine shafts must undergo visible change. Local state-run coal mines must become backbone mines that "produce regularly, that are safe and that can produce steadily, and that take benefits into consideration". Collective coal mines of communes and brigades should gradually develop healthily through "assistance, reorganization, improvement and joint ventures".

To realize the goals described above, we are further perfecting the economic policy, implementing many measures, establishing a development fund for local coal mines. We are strengthening geological surveying work in a big way to provide data for the building of shafts for local coal mines. We are insisting on the policy of safe production and gradually improving safe production conditions. Based on the use of capital, we should carry out technical improvements well, hasten the construction of new shafts, conscientiously reorganize enterprises and manage the overall situation.

Today, the workers of local coal mines in China are encouraged by the spirit of the 12th Party Congress and are exerting efforts to make new contributions at their own work posts.

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QUALITY, VARIETY OF COAL MINING MACHINERY IMPROVES

Beijing MEIKUANG GONGREN [COAL MINER] in Chinese No 12, 1982 pp 7-8

[Article: "Coal Mining Machinery Manufacturing Progresses During Readjustment"]

[Text] Development of Technical Services

Since the Third Plenum of the 11th Party Congress, coal mining machinery manufacturing has grown. In 1979, the output of products reached 200,000 tons, an increase of three and a half times over that in 1965. In 1981 during the period of readjustment, the total industrial production value of key coal mining machinery plants increased 11 percent over that in 1980. The output of completed products reached over 140,000 tons, an increase of 3.4 percent over 1980. The estimated loss at the beginning of the year was 29,000,000 yuan. The actual profit realized was 28,500,000 yuan. Such a good result was achieved because we mainly grasped the improvement of business ideology, business work style, business methods and service attitude. We established the China Special Coal Mining Equipment Service Company and the China Coal Mining Safety Equipment Company and service stations in major mining areas. According to incomplete statistics of 23 plants, a total of 118 technical service teams were dispatched to provide service to 215 mines and geological teams of 68 mining bureaus in 21 provinces and autonomous regions. In the course of developing service widely, the links between the plants and mines were strengthened, production and marketing channels were opened up, users gained more understanding of the situation of the machinery plants, and at the same time, each plant fed back opinions and requirements of the users to the production departments, the business departments, technical management departments, and the development of services further promoted the improvement of business management at the plants. For example, the Jiyuan Miner's Lamp Factory took the initiative to hold a technical training class for 51 coal mines and repaired the lamps in the mines. Such efforts were welcomed by the coal mines.

Improvement of Product Quality

For several years, we grasped the activities to improve the grades of product quality and to create superior products. We promoted overall quality management, strengthened and perfected the means of testing. We inspected 8 types of

products in 23 specifications. The SGW-150C bendable scraping plate conveyor manufactured by the Zhangjiakou Coal Mining Machinery Plant in Hebei received a goal medal from the state in 1981. The KS-8 acidic miner's lamp manufactured by the Zhejiang Coal Mine Lamp Factory, the ASZ-30 automatic revivifier manufactured by the Fushun Coal Mine Safety Instruments Factory in Liaoning, the HZWA metallic pillars manufactured by the Huainan Coal Mining Machinery Plant in Anhui, the 40T bendable scraping plate conveyor manufactured by the Northwest Coal Mining Machinery Plant in Ningxia, the YBC series geared oil pump manufactured by the Shijiazhuang Coal Mining Machinery Factory in Hebei, the Gaoshan brand DZ external column single body hydraulic prop manufactured by the Zhengzhou Coal Mining Machinery Factory in Henan, the DS_2 B-40 explosion insulating triple phase asynchronous electric motor manufactured by the Northwest Coal Mining Machinery Factory in Ningxia all received silver medals from the state from 1979 to 1981. The JD-11.4 dispatching windlass manufactured by the Huainan Coal Mining Machinery Plant, the SGW-44A scraping plate conveyor manufactured by the Yanzhou Coal Mining Machinery Plant and others totalling 13 products have received the superior quality product award given by the Ministry of Coal Industry.

Since the beginning of this year, the quality of products has improved further. According to the results of an inspection of some products conducted during the first half of this year, 13 products or parts have been named superior products by the Ministry of Coal Industry because the quality of these products (parts) was upgraded and superior quality designs have been realized. Scraping plate conveyors manufactured by some plants have been disqualified in routine inspection since 1978, but this year, all products manufactured by all production factories met the requirements as qualified products in this year's routine inspection. The major performance of all of them were qualified and the percentage of qualification of the main aspects of major parts also surpassed 85 percent.

Increase in New Product Varieties

For several years, the varieties of electrical and mechanical products for coal mining have realized new development. From the mid 1960s to the present, the varieties of products have developed to over 320 kinds, and comprehensive mechanized coal mining equiping possessing advanced levels have already been batch produced, for example, the buttress type, protective type, supported protective type hydraulic props for stopping heights of 1.2 to 3.5 meters, the double barrel mining machine with an electrical motor with a power of 150 kilowatts and 170 kilowatts suitable for use in gently inclining faces of medium thickness coal seams, the SGW-250 model double chained bendable scraping plate conveyor which can transport 600 tons of coal per hour, the SGW-180 model single chained bendable scraping plate conveyor which can transport 500 tons of coal per hour, the DSP-100 flexible rubber belt conveyor which has a belt width of 1 meter and which can transport 630 tons of coal per hour, and the transfer machine for the rubber belt conveyor.

Since the beginning of this year, new developments in the [illegible] have been realized again. The research and development [illegible] for comprehensive mining of thick coal seams with a stepping height of 4. [illegible] meters have realized welcomed achievements in less than one year since [illegible] began in June of last year. Now, the prototypes of the heavy double chain [illegible] scraping plate conveyor of 320 kilowatts developed by the Northwest Coal Mining Machinery Plant, the BY320-23/45 model two pillar protective type hydraulic prop and the BC520-25/47 model four pillar supported protective hydraulic prop developed by the Beijing Coal Mining Machinery Plant have all been successfully developed. The prototype of the 300-kilowatt mining machine developed by the Xian Coal Mining Machinery Plant is being intensively organized for production. The scraping plate conveyor and the hydraulic prop which have already been successfully developed have been tested by the factories, and they have been evaluated by experts in scientific research, users, manufacturers and universities and colleges. They all believe the products have reached the designed requirements and their performance is good.

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COAL

BRIEFS

1982 NATIONAL COAL EXTRACTION FIGURES--In 1982, China produced 644 million tons of coal, 24.4 million tons over the plan and more than the record of 635.5 million tons mined in 1979, maintaining high quality. The western regions overcame transportation problems to complete the monthly raw coal production plan. The year's total production of 350 million tons exceeded the state plan by 5 million tons. Local coal mines at all levels of government authority produced 294 million tons of raw coal, 15,900,000 tons over the state plan. [Summary] [Beijing RENMIN RIBAO in Chinese 3 Jan 83 p 2]

ZHEJIANG 1982 COAL OUTPUT--As of 20 December 1982, Zhejiang's raw coal output had reached 102.13 percent of the plan, 6.28 percent more than the same period last year. For bone coal, 105.86 percent of the yearly plan had been met, 7.12 percent more than the same period last year. All economic and technical quotas were met satisfactorily. [Text] [Hangzhou ZHEJIANG RIBAO in Chinese 28 Dec 82 p 1]

SHAANXI FINDS NEW RESERVES--This year, more than 64.7 billion tons of new coal reserves have been verified in the Yulin-Shenmu-Fugu prospecting zone of the Jurassic coal fields in northern Shaanxi Province, bringing the reserves in this area to over 71.9 billion tons. The coal here is of high quality and buried at shallow depths, making it easy to exploit. Most of the coal is found in four seams with an average thickness of a little over 12 meters. [Text] [Beijing BEIJING RIBAO in Chinese 29 Dec 82 p 4]

NEW HENAN MINE--A new large-scale modern coal mine--the Gengcun mine of the Yima Mining Bureau in the western Henan coal fields--formally went into production on 28 December. The Gengcun Mine has an annual design production capacity of 1,200,000 tons. The coal is of the long-burning variety, a good motive power and industrial raw material. The mine has a high level of mechanization. [Text] [Beijing BEIJING RIBAO in Chinese 29 Dec 82 p 4]

CSO: 4013/129

OIL AND GAS

TECTONIC TYPES OF OIL AND GAS BASINS IN CHINA IDENTIFIED

Beijing SHIYOU XUEBAO [ACTA PETROLEI SINICA] in Chinese, No 3, Jul 82 pp 1-11

[Article by Li Desheng [2621 1795 3932] of the Petroleum Prospecting and Development Sciences Research Academy: "Tectonic Types of Oil and Gas Basins in China*"]

[Text] [Abstract]

There are three basic tectonic types of oil and gas basins in China:

1. The oil and gas basins in eastern China--tension basins. There is a series of intraplate rift-subsided-depression basins east of Daxinganling-Taihangshan-Three Gorges of the Chang Jiang. The mechanism of their formation is related to the upwarping of the upper mantle. For example, the basins of Bohai Bay, northern Jiangsu and the Jianghan area are polycyclic rift-subsided-depression basins. The mouth of the Pearl River is the northern epicontinental rift-subsided-depression basin of the enlarged basin of the South China Sea.

2. The oil and gas basins in central China--the transitional basin. The Ordos and the Sichuan basins are intraplate polycyclic depression basins.

3. The oil and gas basins of western China--compressed basins. Junggar, Tarim, and Qaidam are large oval-shaped composite basins between collision compressed zones. The Wusu, Kuche, Jiuquan and Minle basins are piedmont depression basins. Turfan is an inter-mountain basin of Tianshan.

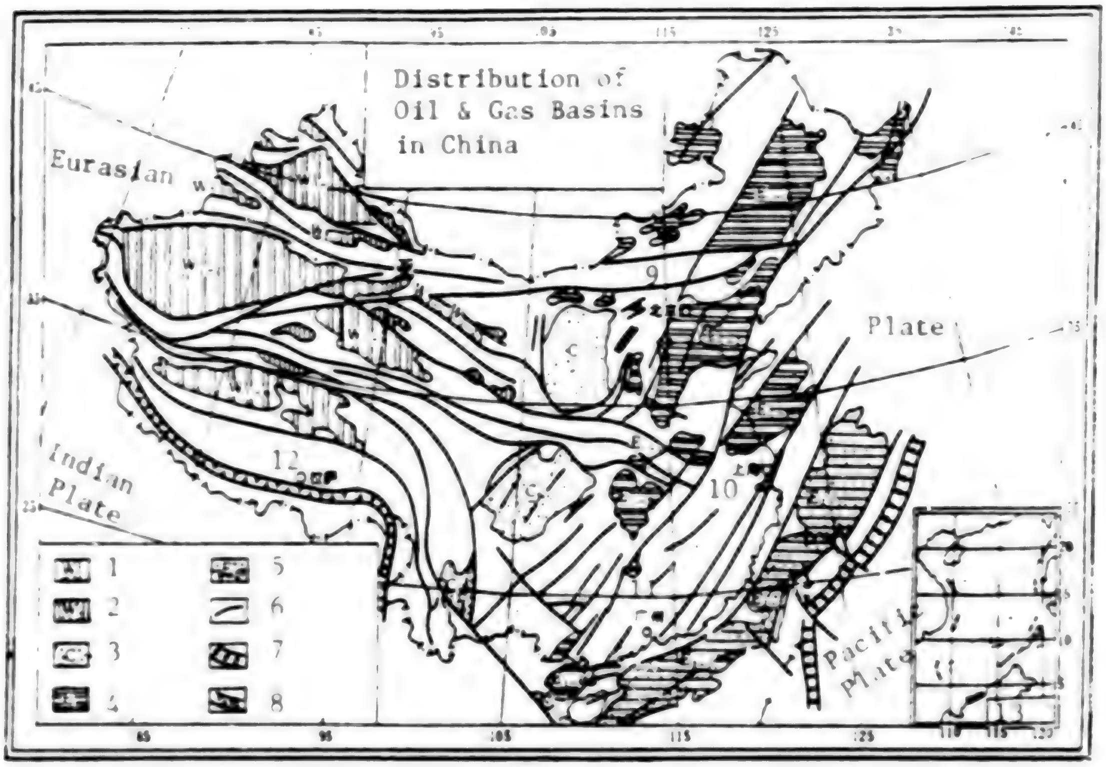
Foreword

China has an area of 9,600,000 square kilometers. About 4,200,000 square kilometers are sedimentary basins which have not undergone metamorphism.

* This article was read at the Second Annual Meeting of the China Petroleum Society in Changsha, September 1981.

The area within a depth of 200 meters along the coastal continental shelf is about 1,300,000 square kilometers. The total area of the sedimentary basins suitable for petroleum prospecting in our nation is about 5,500,000 square kilometers (Figure 1).

Figure 1. Distribution of Oil & Gas Basins in China



Key:
1. Large composite basins in the west
2. Western piedmont and intermountain basins
3. Central intraplate depression basins
4. Eastern intraplate rift subsided basins
5. Eastern continental margin rift subsided basins
6. Major fault line
7. Western Pacific Subduction Zone
8. Yarlung Zangbo River collision belt
9. Beijing
10. Shanghai
11. Guangzhou
12. Llasa
13. South China Sea islands

According to the thickness and structure of the lithosphere of the Chinese mainland and the continental shelf, there are two types of crusts: the continental crustal zone and the marginal zone of the continental crust. The history of specific geological development of China's continental crust controls the types of oil and gas basins, the distribution of sedimentary rock, and the activity of igneous rock affects the geothermal gradient, determines the time of genesis and migration of oil and gas and the type of traps of oil and gas deposits.

At present, China produces 100 million tons of crude oil annually, mainly from sedimentary basins of the Mesozoic and Cenozoic eras in continental crustal zones (intraplates). Petroleum prospecting in the marginal zones of the continental crust (including a part of the continental shelf) is still in the stage of general surveying and regional prospecting.

I. History of Geological Development

From the Sinian sub-era to the Cenozoic era, China's continent and the continental shelf underwent a relatively complex history of geological evolution.

1. Proterozoic Group. The Chinese continental crust is composed of four ancient bases of North China, Jiaoliao, Yangzi and Tarim. It underwent katogenic metamorphism during the Luliang Movement. By the middle of the Proterozoic era, northern China was submerged under sea water, and sedimentary geostrata (geological age of about 1.9 billion to 800 million years ago) of mainly siliceous dolomite of marine facies of the Sinian subgroup formed. Maximum thickness reached 9,400 meters. They are characterized by source rocks rich in algae fossils. There are oil seepages and asphalt in the shale outcrops and the dolomite of the Sinian subgroup in the Yanshan zone. High-yielding oil deposits have been discovered in the hidden mountains of the inclined rift blocks of the Paleozoic group or the Sinian subgroup underneath the plane of unconformity at the bottom of the Tertiary system of the Central Hebei Plain.

Katogenic metamorphism in southern China lasted until the late Proterozoic era. After the Jinning Movement, siliceous dolomite of marine facies of the late Sinian system (about 800 to 600 million years ago) was 300 to 700 meters thick and it contained fossils of blue green algae and green algae. Dolomite of the Sinian system of the Sichuan Basin is an important layer of gas deposits.

2. Paleozoic Group. At the end of the Sinian Period, the Jixian Movement in the north (about 800 million years ago) caused upwarping of Xinjiang, Nei Monggol, Heilongjiang, the Jiaoliao regions, and Korea to form land. Sedimentation from the Lower Cambrian Epoch to the Middle Ordovician Epoch in the shallow sea regions surrounding the land mass was mainly carbonatite with thin interspersed layers of mudstone and evaporite. The thickness was about 1,000 to 1,500 meters. After the mid-Ordovician epoch, the mantle in the area of Nei Monggol surged upward. The crust of the Asian continental land mass cracked. A very thick marine facies sedimentation was formed inside the geosyncline in Nei Monggol between Siberia and northern China. A new continental crust added itself onto the surrounding area of the ancient continental crust. The North China platform continued to rise until the early Carboniferous Epoch, when it was subjected to a long period of disintegration and peneplanation.

Southern China received sedimentation of carbonatite interspersed with thick layers of shale of marine facies throughout the entire Paleozoic Era. The thickness reached about 3,000 to 5,000 meters. In the South China region during the Caledonian period, katogenic metamorphism also occurred. The basement of the Japanese islands was connected with the continent at the time. On the side of the Pacific Ocean was a shallow marine sedimentation.

During the Permo-Carboniferous period, the Nei Monggol geosyncline continued to develop. During the Hercynian Movement, katogenic metamorphism of the marginal zone of the continent became more active. Sea and land changes and migration were drastic. During the middle and late Carboniferous epochs, the North China platform generally sank except for some local regions. Coal containing formations of alternating marine and continental facies formed a sedimentation of about 200 to 400 meters thick. During the Permian Period, it became an inner basin of the platform with a red layer of sedimentation of [illegible] to 1,500 meters thick.

The Yangzi Platform underwent broad ingression during the Permo-Carboniferous period. Ingression in certain regions continued to develop up to the Middle Triassic Epoch. The dolomite of the Carboniferous system of the Sichuan Basin and the limestone of the Permian system are broad layers of gas deposits.

3. Mesozoic Group. During the Triassic Period, Kunlun-Qinling-Dabieshan warped up in an east-west strike and crossed northern and southern China to become an important geological border line. At the end of the Permian Period, during the latter period of the Hercynian Movement, movements of the Pacific crust became active. The Nei Monggol geosyncline was compressed, and a large land area extending from north of Qinling to Siberia emerged. The uneven movement of the crust formed depression basins everywhere inside the platforms, such as the Junggar Basin, the Ordos Basin and the Xinshui Basin. Ingression during the Triassic Period entered from the Tethys sea in the southwest into the Yangzi Platform region in southern China.

At the end of the Triassic Period, movement of the Pacific crust became more violent. The Indochina Movement affected the entire southern part of China and forced the sea of the Jurassic Period to recede to Xizang and the western Yunnan region. The sea of the Cretaceous Period receded further to southern Xizang and the southwestern part of the Tarim Basin.

During the Jurassic and the Cretaceous periods, all of China was influenced by the Yanshan Movement. The basins formed in central and western China during the Triassic Period generally underwent successive development, such as the Junggar Basin, the Ordos Basin, the Sichuan Basin and the Chuxiong Basin. Violent folding, rifting and medium acidic volcanism occurred in eastern China. The Palaeozoic group platform rifted under tension and the mantle surged upward locally, forming a series of intraplate rift subsided-depression basins, such as the Songliao Basin, the Bohai Bay, northern Jiangxu-southern Yellow Sea basin, Jianghan Basin and the Beibuwan Basin.

4. Cenozoic Group. During the Eocene Period, the entire eastern region underwent mainly rising and falling block movements. The Eocene depressions of the Bohai Bay Basin, northern Jiangsu-southern Yellow Sea basin, Jianghan Basin, Beibuwan Basin and Zhujiangkou Basin were all formed by a series of dustpan shaped rift subsidence or graben rift subsidence. Sedimentation of a lacustrine sedimentary layer occurred to form important source rock and rock deposits of oil.

In southwest China, the northern arm of the [illegible] thrust of the Indian Plate towards the Eurasian [illegible] and Sanjiang compressed fold zone underwent upwarping [illegible] small Xizang-western Yunnan plate and the Eurasian Plate [illegible] together. The Tertiary Tethys Sea remained only as a narrow, [illegible] in the Himalayan region. Another arm extended into the south[illegible] of the Tarim Basin in the area of Kashgar and Yecheng.

The Himalayan Mountain Movement was the active period [illegible] China's eastern rift subsided-depression basins and the formation [illegible] tonics of the western Pacific ocean trench-island arc-marginal [illegible] the East China Sea Basin, the western depression of the East China Sea [illegible] first formed by tension rift subsidence of the arc, and then [illegible] of the basin. Later, the eastern depression (Okinawa Trench) of the East China Sea was formed by rift subsidence and depression. After the Pleistocene Epoch, it underwent tension rift subsidence again. The central upwarping between the two depressions may be the remnant island arc prior to the Pliocene Epoch. The present island arc has shifted eastward towards the islands of Japan and Okinawa. The South China Sea Basin is the back arc basin of the Philippine Archipelago. The Zhujiangkou depression is the northern edge of the South China Sea back-arc basin. During the early Tertiary Period it underwent a period of rift subsidence. After the Middle Miocene Epoch it changed from a depression of lacustrine facies to a semi-closed sea and then to open marine sedimentation.

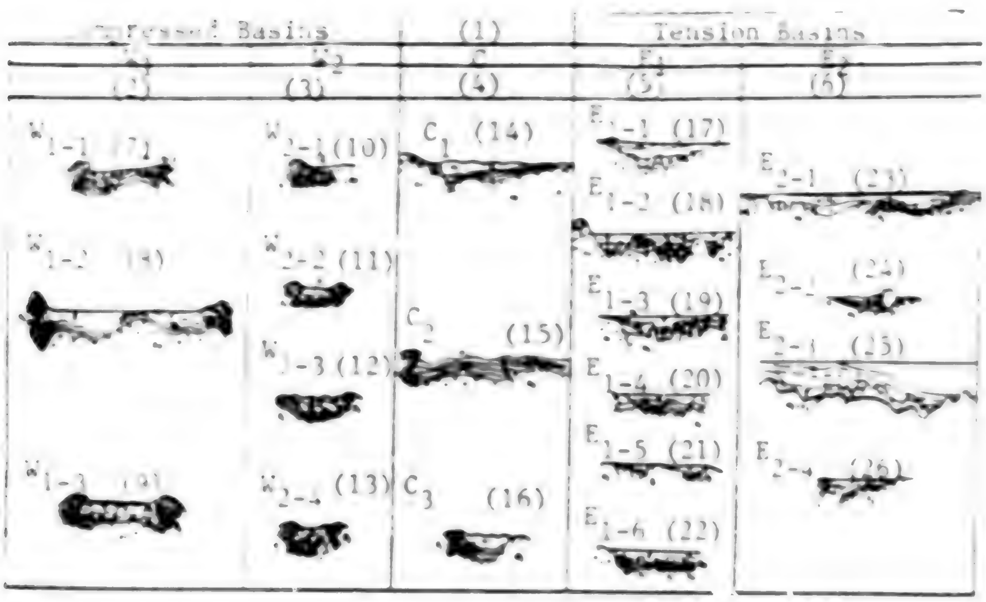
Abundant petroleum and natural gas resources have already been discovered in the sedimentary basins of the Tertiary Period on the Chinese continent and in the coastal continental shelf.

II. Tectonic Types of Basins

There are three basic tectonic types of oil and gas basins in China (Figure 2):

1. Oil and gas basins in eastern China--tension basins. The present output of crude oil of oil and gas basins in eastern China constitutes over 90 percent of national output. These basins are all tension type oil and gas containing rift subsided-depression basins of the Mesozoic and Cenozoic eras developed on the ancient and complex bases of the inner crust. They are large in scale, there are many types, and the order of development is more obvious. According to geophysical prospecting and petroleum drilling data gathered from the oil and gas basins in the eastern China in recent years, we have obtained a definite degree of understanding of the regional tectonic properties of each of the basins (Table 1).

Figure 2. Tectonic types and tectonic sections of China's main gas and oil basins



Key:

1. Transitional basins
2. Composite basins between compressed belts
3. Piedmont, intermountain basins
4. Intraplate depression basins
5. Intraplate rift subsided, depression basins
6. Continental margin rift subsided, depression basins
7. Junggar Basin
8. Tarim Basin
9. Qaidam Basin
10. Jiuquan Basin
11. Minle Basin
12. Turfan Basin
13. Yili Basin
14. Ordos Basin
15. Sichuan Basin
16. Chuxiong Basin
17. Song-Liao Basin
18. North China Basin
19. Northern Jiangsu-Southern Yellow Sea Basin
20. Jianghan Basin
21. Nanxiang-Biyang Basin
22. Beibuwan Basin
23. East China Sea Basin
24. Taiwan Basin
25. Zhujiangkou Basin
26. Yinggehai Basin

Table 1. Regional Tectonic Properties of Major Oil & Gas Basins in Eastern China

Name of Basin	Song-liao	Bohai Bay	(1)	Nanyang-Biyang	Jiang-han	Beibu-wan	Yingge-hai	Mouth of the Pearl R.	W. East China S.	E. East China S.
Area ($10,000\ km^2$)	26	20	13.1	0.46	7.9	4	6	14	26	14.5
Geomorphology	Plain	Plain	Plain	(2)	Plain	(3)	(3)	(3)	(3)	(3)
Ocean depth		0-50m	0-60m			0~50 m	0~500 m	0~200 m	50~200 m	500~2700 m
Base	(4)	(5)	(6)	(5)	(6)	(7)	(8)	M_z granite	(9)	Mz E Folded Base
Sediment cap layer	J, K, R, Q	Z, Pz, Mz, R, Q	Z, Pz, Mz, R, Q	Mz, E	Z, Pz, Mz, R, Q	Pz_1, R, Q	Mz, R, Q	R, Q	R, Q	R, Q
Sedimentary rock thickness (km)	4~6	3~10	4~11	4~8	3~12	4~6	2~10	2~8	5~8	3~4.5
Magnetic field characteristics	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	Discontinuous pos. anomaly
Gravity characteristics	Bouguer 10~20 mg	Bouguer 10~20 mg	-5~15mg	Bouguer negative	Bouguer 10~20 mg	Bouguer 0~15 mg	0~30mg	0~50 mg	Bouguer 0~20 mg	Bouguer 20~160 mg
Thickness of crust (km)	27~35	29~37	33~36	37	35-	36	30~32	26~30	25~30	15
Geothermal gradient (°C/km)	37	33~45	30~32	37	31~32	40	40	42~48	33	4~8 H.F.U
Magma activity	(19)	(20)	(20)		(21)	(19)	(22)	(21)	E (23)	Q basalt eruption
Seismic activity	weak	(24)	(25)	weak	weak	weak	(26)	(25)	(24)	Deep & shallow earthquakes
System of oil & gas stata	creta-ceous	(27)	(28)	tertiary	tertiary	(29)	tertiary	ter-tiary	tertiary	
Tectonic types of basins	(30)	(31)	(31)	(32)	(31)	(30)	(33)	(33)	(34)	(35)

[Key on following page]

[Key to Table 1]

1. Northern Jiangsu-Southern Yellow Sea
2. Hilly intermountain regions
3. Coastal continental shelf
4. P_z folded base
5. Anz crystalline bedrock
6. Pt_1 metamorphic bedrock
7. Pz_1 metamorphic bedrock
8. P_z metamorphic bedrock
9. M_z volcanic-sedimentary rock
10. Wide, gentle normal anomaly
11. NE positive and negative anomaly
12. NEE positive and negative anomaly
13. High magnetic reflection igneous rock
14. Anomaly zone with wide, gentle variations
15. Low, gentle rising magnetic field
16. NW magnetic field variation
17. Large area magnetic anomaly
18. NE positive and negative anomaly
19. Quaternary system basalt
20. Cenozoic Era basalt
21. Tertiary Period basalt
22. Early Tertiary neutral volcanic rock
23. E medium basic volcanic rock
24. Violent, linear distributuion
25. More violent
26. More violent linear distribution
27. Tertiary system to Sinian subgroup
28. Tertiary system, Triassic system
29. Tertiary system, Palaeozoic Group
30. Intraplate rift subsided and depression basin
31. Intraplate polycyclic rift subided and depression basin
32. Intraplate small rift subsided basin
33. Epicontinental rift subsided and depression basin
34. Back-arc inactive epicontinental rift subsided and depression basin
35. Back-arc active epicontinental rift subsided basin

(1) All of the bases of the large sedimentary basins in eastern China are ancient land blocks. The base rock of the Bohai Bay Basin is of the Archaean group. The base rock of the Nanyang-Biyang Basin, the Jianghan Basin and the Northern Jiangsu-southern Yellow Sea Basin is of the Proterozoic group. The base rock of the Song-Liao Basin is of the Palaeozoic group. These deep land blocks are generally similar in size to the present-day basins. The crust of the basins is about 25 to 37 kilometers thick.

Since the Middle Cenozoic Era in eastern China, the Pacific Plate has been subducted under the Eurasian Plate, causing China's continental crust to creep eastward, and crustal fracture zones have been produced along the north-northeast strike. The Upper Mantle warped up along the thinning crustal zones of the mantle thinned and the upper strata of the crust were subjected

to tension stress, causing the original base block of the Palaeozoic group to break and forming a series of dust-pan shaped or graben type gravity rift subsided basins. These evolved into large depression basins. Thus, China's eastern crust possesses a double mechanism of intra-continental proliferation and epicontinental proliferation in crustal evolution.

2. The oil and gas basins developed in the interior of the Huabei Platform and the Yangzi Platform have polycyclic sediments. On the crystalline base rock of the pre-Sinian period are sedimentary formations of carbonatite of marine facies of the late Proterozoic era and the Palaeozoic era. The lithological character is stable, and there are conditions for the genesis of oil and gas. The rift subsided-depression basins of the overlapping Mesozoic and Cenozoic eras contain oil and gas genesis and storage cap compositions of the new eras. Therefore, the Bohai Bay Basin, northern Jiangsu-southern Yellow Sea basin and Jianghan Basin are intraplate polycyclic rift subsided-depression basins. The Song-Liao Basin, the Nanyang-Biyang Basin and the Beibuwan Basin are oil and gas basins developed on the background of the geosyncline folded zones. The geostrata prior to the late Proterozoic group or the upper Palaeozoic group had all undergone regional metamorphism. Only the Mesozoic Era and the Cenozoic Era have major oil genesis periods. Therefore, the Song-Liao and Beibuwan Basins are intraplate rift subsided-depression basins. The Nanyang-Biyang Basin is a small intraplate rift subsided basin. The base of the Zhujiangkou Basin contains metamorphic rock series of the Palaeozoic group and granite of the Mesozoic group. The base of the Yinggehai Basin contains metamorphic rock series of the Palaeozoic group and granite of the Mesozoic group. The base of the Yinggehai Basin contains metamorphic rock series of the Palaeozoic group. Located on the northern edge of the South China Sea expansion basin, it is an epicontinental marginal rift subsided-depression basin and a Cenozoic basin formed by the epicontinental tension rifts in southern China. It possesses oil genesis and storage cap compositions of the Tertiary system. The East China Sea Basin and Taiwan's western basin have undergone folding metamorphism of the Palaeozoic group, Mesozoic group and the old Tertiary system. They possess the cyclic structure of the oil genesis and storage cap composition of the new Tertiary system only. The structural properties of the western and eastern depressions of the East China Sea are different. The thickness of the crust of the western depression is 25 to 30 kilometers. The thickness of the central up-warped zone is still 30 kilometers. The thickness of the central up-warped zone is still 30 kilometers. But in the eastern depression (the Okinawa Trench), the thickness drops to 15 kilometers. The upper mantle warps up by a large-scale along the ocean trough. The value of heat flow is 3 to 5 times that in the western depression. Before the Miocene Epoch, the western depression underwent a rift subsidence stage. After the Miocene Epoch, it changed to a depression stage, therefore, the western depression of the East China Sea is an inactive back-arc epicontinental rift subsided-depression basin. The Okinawa Trench has continued to expand and crack since the Pleistocene, and it is an active back-arc epicontinental rift subsided basin.

(3) The lithospheres of large rift subsided-depression basins are relatively up-warped. The size of the up-warped zones of the troughs of the upper mantle is generally consistent with the basins. The amplitude of upwarping is

generally 2 to 8 kilometers. A series of single rift dust-pan shaped depressions or double rift graben depressions have developed on the corresponding upper parts of the large up-warped zones of the mantle. The base consists mainly of reverse normal faults. The normal faults of the inclines of the basins all show a gentle "seat" section. The graduated tectonic belts in the basins are related to the activities of the base blocks or contemporaneous faults on the margins of the basins.

(4) The continuous breaking, expansion and sinking of the bases of the tension basins in the east caused the basins to undergo a course of development of rift subsidence during the early period, depression during the middle period and filling during the late period. They possess sedimentary characteristics due to rapid accumulation. The rate of sedimentation of the geostrata of the Cretaceous system of the Song-Liao Basin was 0.1 millimeters per year. The rate of sedimentation of the geostrata of the Tertiary system of the Bohai Bay Basin was 0.1 to 0.4 millimeters per year. The rate of sedimentation of the geostrata of the Tertiary system of the Jianghan Basin was 0.29 millimeters per year. The rate of sedimentation of the geostrata of the lower Tertiary system of the Biyang Basin was 0.24 millimeters a year. They are one magnitude larger than the 0.01-millimeter per year rate of sedimentation of platform type marine facies. In the main episode of rift activity when the rise and fall of the topography were more violent, sedimentation was unstable. It consisted mainly of coarse clasolite of piedmont facies and diluvial facies. When rift activity began to weaken, the topography flattened and a relatively calm lacustrine environment emerged. A dark mudstone accumulation possessing oil genesis conditions was formed in the depression of the lacustrine basin. Later, rift activity again became active, the basin sank again and was filled with alluvial matter from the rivers. Dust-pan shaped rift subsidence or graben type subsidence separated by protrusions of the bases during the early period was unified by large flat bottom pan-shaped depressions of the later period.

(5) When the tension stress field strengthened further, block differential movements became visibly active. Along the main tension fracture belt were active crevasse eruptions, mainly of basalt or andesite. Rift volcanism caused the upper mantle to dissipate heat, and the heat was gradually absorbed by the upper lithosphere. Therefore, our nation's eastern oil and gas basins are all regions having highly abnormal geothermal gradients. For every 1,000 meters in depth, the earth's temperature rises 30° to 45°C. The earth's temperature at a depth of 5,000 meters under the Dagang Oil Field is 200°C. The threshold depth for the genesis of petroleum in the oil and gas basins of the east is 2,000 to 2,700 meters and the earth's temperature is 60°C to 90°C. Therefore, the source rock accumulated during the rift subsidence period sank after packing by sediments accumulated during the depression period. The series of source rock of oil genesis and storage deposited during the previous period was sealed inside the basin. This favored maturation and conversion of petroleum.

(6) Because oil genesis depressions of different periods are all distributed along the main rift zones of the time, each deep depression is an independent oil genesis region. Important oil and gas fields are distributed around oil

genesis depressions. The distance of migration from the most favorable oil genesis region to the main oil and gas fields is generally several kilometers and to several dozen kilometers, manifesting the characteristics of short-distance sideways migration. Major oil and gas deposits have concentrated inside more favorable traps in the deep depressions. The surrounding satellite oil fields are distributed as belts or rings. When one oil genesis depression is found, a concentrated region of oil and gas is found.

(7) The most favorable oil and gas fields in the deep depressions are anticlinal traps formed during the early period. There are also good matching oil and gas genesis and storage cap compositions, such as the Daqing, Fuyu, Dagang, Dongpu and Wangchang oil fields. A series of rolling anticlinal traps has developed on the descending wall of the growing falt, such as the Shengtuo Oil Field, Yonganzhen Oil Field, Shuangtaizi Oil and Gas Field and the Zhenwu Oil field. A series of overridden tectonic traps of the Tertiary system has developed on the protrusions of the base, such as the Gutao, the Yangsanmu and the Chengbei oil fields. Ancient hidden mountain traps or traps of oil and gas deposits in the base rock frequently formed in inclined blocks under the unconformity plane, such as the Renqiu Oil Field, Yihezhuang Oil Field and Xinglongtai Oil and Gas Field. Some geostrata type traps can form relatively large oil deposits, such as the Liaohe Xixiepo and the Biyang Shuanghe oil fields. The long wall tectonic belt of neighboring deep depressions can concentrate large anticlinal traps to form oil fields. Compound series of oil deposits can also be formed by many types of traps and many sets of oil genesis and storage cap compositions on a two-level tectonic belt.

2. Oil and Gas Basins of Central China--Transitional Basins. The oil and gas basins of central China are situated on the east side of Helanshan-Liupanshan-Longmenshan-Hengduanshan. The genesis and development of the basins since the mid-Cenozoic Era were affected by the composite influence of the tectonic system of the Tethys that crossed the Eurasian Continent and the eastern ring of the Pacific tectonic system. The basins are the products of the dual forces of compression and tension. During the early period of Indochina sandwiched between large latitudinal tectonic belts, a lateral shift in the east-west strike (clockwide shearing) occurred, twisting the Sichuan Basin and the Ordos Basin to become slightly elongated rhombic basins with a northeast-southwest axial line. At the same time, the Songpan-Ganxi collision and compressed tectonic belt in the west northwest strike and the Jinshajiang-Lancangjiang-Nujiang collision and compressed tectonic belt that spread out towards the south like an arc were subjected to the northward thrust of the Indian Plate and violent folding occurred. They impacted in reverse against the Yangzi Platform and the Huabei Platform. Reverse overridden rift zones were produced on the western margins of the Sichuan Basin, the Chuxioang Basin and the Ordos Basin, forming piedmont depressions at the front margins of the rift folded zones at Longmenshan, Ailoshan and Shajingzi. The main body of the basins were compressed torsion type basins of gentle folding influenced by the effect between the active belts and the relatively stable regions. Their structural properties are listed in Table 2.

Table 2. Regional Tectonic Properties of Main Oil & Gas Basing in Central China

Name of basin	Ordos	Sichuan	Chuxiong
Area (10,000 km^2)	32	23	3
Geomorphology	Loess, desert	Hilly region	mountains
Base	anz crystalline bedrock	pt_1 crystalline bedrock	pt_1 metamorphic bedrock
Sedimentary cap layer	Z, Pz, Mz	Z, Pz, Mz	Mz
Thickness of sedimentary rock (km)	6-7	6-10	6-10
Magnetic field characteristics	wide, gentle magnetic field, positive anomaly	wide, gentle variable rhombic mag. field, pos. anomaly	wide, gentle magnetic field, positive anomaly
Gravity characteristics	Bouguer 130 ~ 170 mg	Bouguer 90 ~ 110 mg	Bouguer 200 ~ 250 mg
Thickness of crust (km)	43 ~ 44	38 ~ 42	41 ~ 44
Geothermal gradient (°C/kilometer)	22 ~ 27	25 ~ 30	
Magma activity		Permian period basalt	Xishan period orthophyre
Seismic activity	Liupanshan violent	Longmenshan violent	Hengduanshan violent
System of oil & gas layers	Jurassic system, Triassic system	Jurassic system, Triassic system Permian system, Carboniferous system, Sinian system	
Tectonic types of basins	Intraplate polycyclic depression basin	Intraplate polycyclic depression basin	Intraplate depression basin

(1) The thickness of the crust of oil and gas basins of the central part is 38 to 44 kilometers. They are characterized in common by a high gravity, normal anomaly magnetic field and upper mantle upwarping. They possess a normal geothermal gradient. The earth's temperature rises 22°C to 30°C for every 1,000 meters in depth. The earth's temperature at a depth of 6,000 meters in the prospecting wells of the Longnushi Oil Field in Sichuan was found to be 170°C.

(2) The Ordos Basin (Shaanxi-Ganxu-Ningxia Basin) possesses a crystalline block base from the Archaean era to the lower Proterozoic era. Above it is a Huabei Platform type sedimentary cap layer of the middle and late Proterozoic group and the Palaeozoic group. The Sichuan Basin and the Chuxiong Basin have a folded metamorphic base of the Proterozoic era. The Sichuan Basin has a Yangzi Platform type sedimentary cap layer of the late Proterozoic group and the Palaeozoic group. These three basins formed a major depression belt in the south-north strike in central China during the Indochina period. The Sichuan Basin and Chuxiong Basin were once connected to the Tethys Sea and they possessed properties of marginal seas. During the latter part of the Yanshan Movement, the compression movement from the west intensified and their movement gradually changed from depression to upwarping. Ordos and Sichuan are intraplate polycyclic depression basins. Chuxiong is an intraplate single monocyclic depression basin.

(3) Because the Ordos Basin was further away from the Indian Plate, the compressive force of the plate affected the folded zone on the western edge of the basin and the western precipitous flank of the Tianhuan syncline. The broad lacustrine basin was a gentle westward slanting monosyncline. The angle of inclination of the goestrata was only 0.5 to 1 degree. The geostrata oil deposits of the Jurassic system and the upper Triassic system are the major types of traps. There are anticlinal oil deposits of the Triassic in the areas of Majiatan and Lizhuangzi in the western part of the basin. Oil deposits of the anticlines and blocks of the Jurassic system of the descending wall of reverse overlapped faults have also been discovered in the areas of Yujialiang and Baiyanjing.

(4) The Sichuan Basin was surrounded by folds of different periods. After many compressions and torsions, different levels of tectonic belts were formed. Some of the depositing layers of the Jurassic system inside the traps of gentle cavity anticlines in the east-west strike in the ancient upwarpings in central Sichuan contain oil. The carbonatite depositing layers of the upper Triassic system and the lower Palaeozoic group contain gas. The main gas depositing layer is the dolomite of the Dengyin Group of the Sinian system of the Weiyuan cavity anticline in the southwest. There is a series of box-shaped or comb-shaped anticlines in the north northeast strike in eastern Sichuan, southern Sichuan and western Hubei in the deep and large Huaying Rift Zone. There are reverse faults at the axial part. Several dozen depositing layers already discovered are gas deposits in carbonatite of the Permian and the Triassic systems. The residual brecciated dolomite of the mid-Carboniferous system resulting from denudation in the eastern Sichuan region has been proven to be high yielding gas depositing layers.

(5) Carbonatite of the Devonian system - The Carboniferous system of over 1,000 meters thick is distributed in the northern part of Chuxiong Basin, and there are widespread indications of oil and gas seepage. The main body of the basin is the ancient upwarping. During the Indochina-Yanshan movements, the northward shift of the Xizang-western Yunnan region along the border of the Ailoshan Rift and the right-handed shear of the southward shift of the ancient continental land mass of Xikang and Yunnan formed the Chuxiong Basin. There is a series of compressed anticlinal tectonic belts in the north northeast strike or nearly south-north strike inside the basin.

3. The Oil and Gas Basins in Western China--Compressed Basins. The main stress of the tectonic pattern of the compressed basins in western China comes mainly from orogenesis due to the northward thrust of the Indian Plate. There are four crustal collision and compressed tectonic belts that had developed one after the other from the old to the new between the Altay Mountains, Kunlunshan and the Himalayas. The ancient nuclear area between compressed tectonic belts received a new sedimentary cap layer as the basins sank. Because of the many periods of tectonic activity following the Hercynian Movement, the scope and profile of the basins continually changed. Therefore, the large composite basins in western China are all oil and gas basins that had undergone differentiation, superimposition, and long periods of evolution.

A series of basins of deep depressions formed in the fore of the crustal collision and compressed tectonic belts by the upwarping of the reverse overridden mountain series and the sinking of nuclear area basins. Clasolite of the Tertiary system accumulated and formed a sedimentary layer 3 to 8 kilometers thick. For example, Wusu, Kuche, Yecheng, Jiuquan and Minle are all piedmont depression basins of compressed belts.

Some small intermountain basins of the Cenozoic group are distributed between the parallel mountain series of compressed tectonic belts. When the mountain series expanded and widened, such as the east and west ends of Tianshan, the Turfan and Yili intermountain basins with a relatively wide distribution of the Mesozoic group and the Cenozoic group formed. (Table 3).

Table 3. Regional Tectonic Properties of the Main Oil & Gas Basins in Western China

Name of basin	Tsungari	Wusu	Kuche	Turfan	Tarim	Keshe-yecheng	Qaidam	Jiuquan-minje	Jiangtang N. Xizang
Area (10,000 km^2)	13	2	3	4	56	5.0	12	1.2	16
Geomorphology	piedmont fan, desert	piedmont fan, hills	piedmont fan, hills	hills, desert	desert	piedmont fan, desert	(1)	piedmont fan, hills	plateau, salt lake
Base	Pz folded base	Pz folded base	Pz folded base	Pz folded base	Ar, Pt (2)	Ar, Pt (2)	Pz folded base	Pz_1 folded base	Pz_2, T_{1-2} folded base
Sedimentary cap layer	C-P, Mz, R	C-P, Mz, R, Q	Mz, R, Q	Mz, R.	C-P, Mz, R	Mz, R, Q	Mz, R, Q	C-P, Mz, R, Q	T_3, J, K, R
Thickness of sed. rock (km)	3~10	5~14	5~10	6~10	5~12	8~13	3~10	3~6	3~8
Magnetic field characteristics	Bouguer 100-150mg	150-200mg	150-200mg	175-200mg	125-225mg	200-250mg	325-350mg	175-200mg	525-575mg
Gravity characteristics	-100 -150	-150 -200	-150 -200	-175 -200	-125 -225	-200 -250	325 -350	-175 -200	525 -575
Thickness of crust (km)	45~50	50~55	43~45	55	39~45	45~50	50~55	46~50	70~73
Geothermal gradient (°C/km)	20	17~20	23	20	17~20	17~20	20~28	20~25	
Magma activity	(9)	(9)	(9)	(9)	(10)	(10)	(11)	(12)	(13)
Seismic activity	(14)	(14)	(14)	(14)	(15)	(16)	(17)	(18)	(19)
System of oil & gas layers	(20)	(21)	(22)	(23)	(24)	(21)	(22)	(25)	(21)
Tectonic types of basins	(26)	(27)	(27)	(28)	(26)	(27)	(26)	(27)	(26)

[Key on following page]

[Key to Table 3]

1. Plateau, desert, salt lake
2. crystalline bedrock
3. East-West wide, gentle positive anomaly
4. East-West negative anomaly
5. Northeast, east-west, northwest magnetic field zones
6. Northwest negative anomaly
7. West Northwest wide, gentle positive anomaly
8. West Northwest negative anomaly
9. Hercynian Period volcanism
10. Permian Period diabase, basalt
11. Palaeozoic Era granite
12. Caledonian Period granite
13. Yanshan Period granite, basic rock
14. Tianshan more violent
15. Tianshan, Kunlunshan more violent
16. Kunlunshan more violent
17. Aerjinshan more violent
18. Qilianshan more violent
19. Weak-relatively violent
20. Permian-Triassic, Jurassic systems
21. Tertiary system
22. Tertiary system, Jurassic system
23. Cretaceous system, Jurassic system
24. Tertiary system, Jurassic system, carboninferous system
25. Tertiary system, cretaceous system, Silurian system
26. Large composite basin between collision, compressed zones
27. Piedmont depression basin
28. Intermountain basin

(1) The thickness of the crust of oil and gas basins in the west is greater, generally 40 to 50 kilometers and it can reach 5 to 70 kilometers.

(2) The heat flow value is low, and there are normal or slightly lower geothermal gradients. For every depth of 1,000 meters, the earth's temperature rises 20°C to 26°C. The earth's temperature at a depth of 6,000 meters in the prospecting well in the western part of the Qaidam Basin is 198°C.

(3) The formation of the tectonics of oil and gas fields is actually a process of shortening, overlapping and thickening of the geostrata due to compression on the plane surface. The interior of the sections drilled at the bottom of shafts has not reached the volcanic rock of eruptive rock. The volcanic rock forming the base of the basins is generally acidic rock types of the Caledonian period or the Hercynian period.

(4) Differentiation in the sediments of the Mesozoic group and the Cenozoic group is more obvious. The lateral variations of the lithological character and thickness at the margin and the central part are large, and they possess characteristics of sideways varying sediments. Because the topographic contrast is large, therefore, th depositing layers of oil and gas fields of the

Tertiary system in the western parts are all red layers. In places, there are even psephyte layers of piedmont diluvial facies. The source rock is generally the underlying geostrata of the old Tertiary system, the Cretaceous system, the Jurassic system or the Palaeozoic group. There is also fine-grained argillaceous rock in the deep depressions of the lacustrine basins of the Permian and the Triassic systems. The bodies of water in lacustrine basins are affected by the arid climate, and generally they condense to become highly mineralized oil and water fields.

(5) The geological tectonics of the oil fields of oil and gas basins in the west are generally anticlinal traps. Anticlinal tectonics usually are not symmetrical. For example, the northern flank of the Laojunmiao Oil Field is precipitous and nearly erect. The southern flank is gentle with an angle of inclination of about 15 to 20 degrees. When the angle of inclination of the surface of the reverse overridden fault is gentle, oil and gas deposits in gently compressed anticlines frequently develop on the descending walls of the surfaces of the faults, such as the Gasikule Oil Field in the Qaidam Basin. Or else, "hat rim oil deposits" are formed below the reverse imbricate faults, such as the oil deposits of the Carboniferous system, the Permian system, the Triassic system and the Jurassic system of the precipitous descending wall of the large Ke-He rift of the Karamay Oil Field.

(6) Due to new tectonic movements, there is a widespread distribution of ground surface oil and gas in the oil fields and the surrounding areas. There are oil springs, oil sand, ozokerite veins, asphalt lakes along the anticlinal axis and the fault lines. The oil deposits of the Triassic system in the No 1 to No 6 zones of the Karamay Oil Field extend from the venter up to the ground surface, forming large geostrata oil deposits.

Conclusion

Most of our nation's oil and gas basins are formed in the continental crustal interiors or continental margins with a different history of formation. They possess a series of sourcr rock of polycyclic development and they possess rick oil sources of both continental facies and marine facies. Every new stage in the course of formation of the basins had developed on the basis of the previous stage. At the beginning period, each stage inherited the tectonic and sedimentary relations of the previous stage and each accuired a new tectonic type and new characteristics as it developed further. Whether the crust was stable or active, whether during the course of development of the early period or the late period, there were tectonic and sedimentary conditions suitable for the formation of oil genesis cap compositions (Figure 3).

Figure 3. Evolution of Geological Tectonics of China's Main Oil and Gas Basins

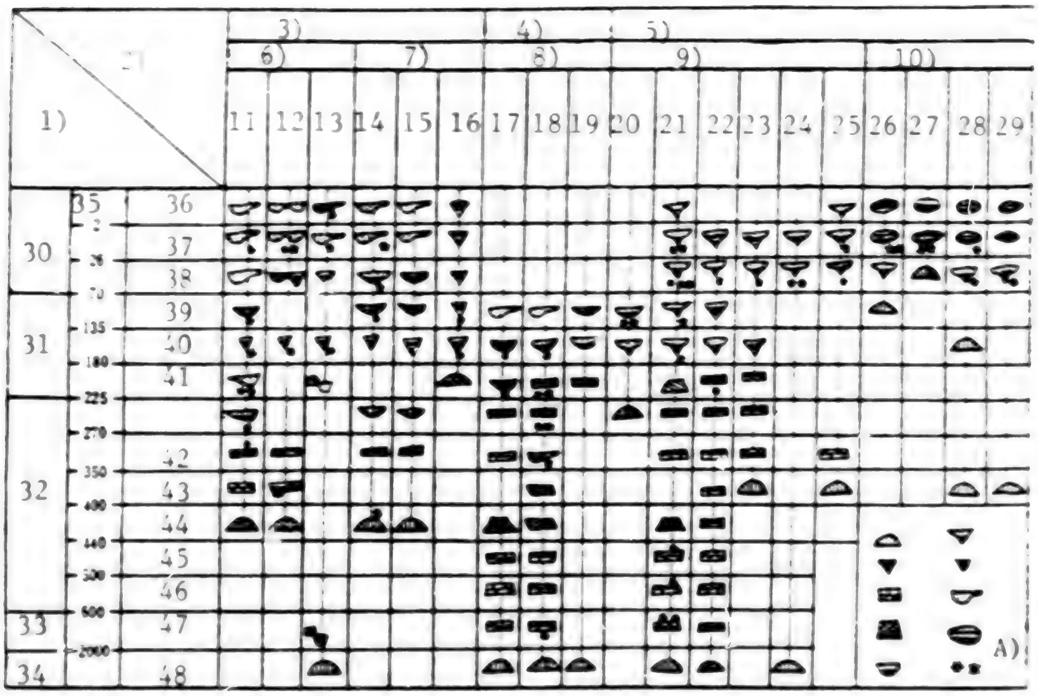


图3 中国主要含油、气盆地地质构造演化史图

A: 1—变质基岩，2—地槽，3—地台，4—隆起，5—复合盆地，6—断陷-拗陷盆地，7—山间盆地，8—山前拗陷盆地，9—陆壳边缘盆地，10—含油、气层

Key:

A: 1 - metamorphic base rock
2 - geosyncline
3 - platform
4 - upwarping
5 - composite basin
6 - rift subsided-depression basin
7 - intermountain basin
8 - piedmont depression basin
9 - epicontinental basin
10 - oil and gas layers

1. Geological period
2. Basin
3. Compressed oil and gas basin
4. Transitional oil and gas basin
5. Tension type oil and gas basin
6. Composite basins between compressed zones
7. Piedmont, intermountain basins
8. Intraplate depression basin
9. Intraplate rift subsided-depression basins
10. Epicontinental rift subsided-depression basins

11. Junggar Basin
12. Tarim Basin
13. Qidam Basin
14. Jiuquan Basin
15. Minle Basin
16. Turfan Basin
17. Ordos Basin
18. Sichuan Basin
19. Chuxiong Basin
20. Song-Liao Basin
21. North China Basin
22. Northern Jiangsu-southern Yellow Sea Basin
23. Jianghan Basin
24. Nanyang-Biyang Basin
25. Beibuwan Basin
26. East China Sea Bain
27. Taiwan Basin
28. Zhujiangkou Basin
29. Yinggehai Basin
30. [illegible]
31. [illegible]
32. Palaeozoic Era
33. Proterozoic Era
34. Archaeozoic Era
35. million years
36. Quaternary Period
37. New Tertiary Period
38. Old Tertiary Period
39. Cretaceous Period
40. Jurassic Period
41. Triassic Period
42. Carboniferous Period
43. Devonian Period
44. Silurian Period
45. Ordovician Period
46. Cambrian Period
47. Sinian Period
48. Pre-Sinian Period

Whether it is a large composite basin between compressed belts, intraplate depression basin, intraplate rift subsided-depression basin or epicontinental rift subsided-depression basins, on land or in the ocean, the basin should always be regarded as a whole in general prospecting and surveying for petroleum so that we can evaluate the resources of oil and gas of the early periods of those tectonic belts with different characteristics inside the basins according to petro-geological conditions. We should select the tectonic belt that has the best conditions and that is the most hopeful for pre-prospecting or physical prospecting. It is possible in this way to more quickly discover large-scale oil and gas deposits or composite oil and gas concentration belts consisting of a series of medium and small oil and gas deposits. Such regional prospecting procedures has been proven to be a successful experience in the discovery of the Karamay Oil Field, the various oil fields in Daqing Oil Fields and the various oil fields along the coast of Bohai Bay. More visible results have been obtained using comprehensive prospecting methods in some small piedmont depression basins or intraplate rift subsided basins, such as the western basin of Jiuquan and Biyang Basin.

Generally speaking, the oil genesis and storage cap compositions in intraplate polycyclic oil and gas basins are formed early and they persist for a long time. The newest cycle of oil genesis and storage cap compositions is kept relatively intact in the basin. The oil genesis and storage cap compositions formed relatively early below it are frequently not completely preserved because of reformation by tectonic movements of the later periods. The genesis, migration, concentration and redistribution processes of oil and gas are more complex. Therefore, in polycyclic oil and gas basins, the first to be exploited is frequently the storage and concentration layers of the new period on the top, or the oil and gas deposits in the hidden mountains related to the body of the source rock of the new period. As the depth of prospecting increases, and when the oil genesis and storage cap compositions of the bottom

part become important target layers, prospecting technology and technical conditions for prospecting will need to be improved correspondingly. Frequently, the evaluation of oil strata was affected because technology and technical conditions for deep shaft drilling, extracting and testing were not up to standard.

During the 30 years after liberation, our nation has successfully developed several hundred oil and gas fields. The geological eras of the oil and gas layers include the Cenozoic group, the Mesozoic group, the Palaeozoic group and the Sinian subgroup. There are many different types of oil and gas traps. There are the tectonic type, the geostrata type, the mixed type and the hidden mountain type. They show that our nation's oil and gas resources are abundant. The work of prospecting and developing oil and gas fields has realized great achievements. As petroleum prospecting progresses, we can expect to realize new growth in oil and gas resources.

During the course of writing this article, the various oil fields throughout the nation provided data and information. After this article was drafted, Professor Zhang Wenyou [1728 2429 0147] proposed opinions for revision. The writers thank all of them.

(This article was received on 20 July 1981)

REFERENCES

[1] Zhu Xia [2612 1115], 1978, Preliminary Ideas on Several Basic Geological Questions concerning the Oil and Gas Basins of Marine Facies of the Cenozoic Group in Our Nation, "Special Issue on Petro-geological Experiments".

[2] Zhang Kai [1728 1956], Luo Zhili [5012 1807 4539], Zhang Qing [1728 3237] et al, 1980, The Zoning and Future of China's Oil and Gas Basins. "Shiyou Xuebao" (Acta Petrolei Sinica), No 4, Vol 1.

[3] Geology Department of the Daqing Oil Field, 1978, Discussion on the Characteristics of Tectonic Development of the Song-Liao Basin. "Shiyou Kantan Yu Kaifa" (Petroleum Exploration and Development), No 2, 1978.

[4] Li Desheng [2621 1795 3932], 1980, Characteristics of Geological Tectonics of the Oil and Gas Basin of Bohai Bay, "Shiyou Xuebao" (Acta Petrolei Sinica), No 1, Vol 1.

[5] Tong Chongguang [4547 1504 0342], 1980, Geological Characteristics of the Rift Valley System in Eastern China, "Shiyou Xuebao" (Acta Petrolei Sinica), No 3, Vol 1.

[6] Chen Yixian [7115 5030 6343], 1980, Preliminary Study of the Mechanism of Formation of the Liaohe Rift Valley of the Tertiary Period and Petrogeological Questions, "Shiyou Kantan Yu Kaifa" (Petroleum Exploration and Development", No 2, 1980.

[7] Zhu Shuian [2612 3055 1344], Xu Shirong [1776 0013 2837], Zhu Shaobi [2612 4801 1084] et al, 1981, Petro-geological Characteristics of the Biyang Depression in Henan, "Shiyou Xuebao" (Acta Petrolei Sinica), No 2, Vol 2.

[8] Huang Jiqing [7806 3078 3237], 1980, Preliminary Opinions on the Search for Oil and Gas in the Sichuan Basin and the Ordos Platform Depression, "Shiyou Yu Tianranqi Dizhi" (Oil and Gas Geology", No 1, 1980.

[9] Li Desheng [2621 1795 3932], 1960, "Gansu Petro-geology", Petroleum Industry Press.

[10] Zhao Bai [6392 4101], 1979, Tectonic Properties and Tectonic Characteristics of the Junggar Basin, "Shiyou Kantan Yu Kaifa" (Petroleum Exploration and Development, No 2 1979.

[11] Klemme H.D., 1980, Types of Petroleum Basins, "Paper presented at the International Academic Forum on Beijing Petro-geology".

[12] Dickinson W.R., Yarborough H., 1978, Plate Tectonics and Hydrocarbon Accumulation.

[13] Emery K.O., 1977, Structure and Stratigraphy of Divergent Continental Margins.

[14] Karig D.R., 1974, Evolution of Arc Systems in the Western Pacific (Earth and Planetary) [sic], Ann. Rev. Vol 2.

[15] Murphy R.W., 1975, Tertiary Basins of Southeast Asia, SEAPEX Proceedings, Vol 2.

9296
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NUCLEAR POWER TOUTED AS SAFE, CLEAN, CHEAP ENERGY SOURCE

Hangzhou ZHEJIANG RIBAO in Chinese 31 Aug 82 p 4

[Article by Chang Jinming [2490 6855 6900], Zhao Zhenggi [6392 2973 4388] and Chen Fumin [7115 4395 3046]: "Nuclear Power Plants--A New Force for the Electric Power Industry"]

[Text] According to a 19 August report by the New China News Agency, preliminary construction of the first nuclear power station researched and designed by our nation is being intensively carried out under the guidance and support of the various ministries and commissions of the central government, the City of Shanghai, and Zhejiang Province.

The reactor of the Chinese-made nuclear power station uses a pressurized water reactor. The main body of this reactor is a huge high-pressure steel vessel containing highly pressurized flowing water. It serves as a neutron velocity reducer to reduce the velocity of new neutrons and as a coolant. This reactor uses chemically treated ordinary water, not expensive heavy water. Ordinary water can be easily obtained, it reduces the velocity of neutrons well, and it has a higher specific heat and thermal conductivity. According to statistics, among the nuclear power stations in the world already in operation, pressurized water reactors constitute 64 percent. They are believed by the world's nations to be a safer, more reliable and more economical reactor for nuclear power stations.

Since the world's first nuclear power station was built at the beginning of the 1950s, the nuclear power station now has a history of 30 years. Its development has been quite rapid. Today, there are already some 230 nuclear power stations with a total power of over 130 million kilowatts in operation in the world. Those being built have a power of 220 million kilowatts. All developed nations have built nuclear power stations and many developing nations such as India and Pakistan have also built nuclear power stations. According to statistics, the world's nuclear power plants have already operated cumulatively for over 1,000 "reactor-years" (the reactor of a nuclear power station that operates for 1 year is called one "reactor-year"), and not once has an accident causing personal injury occurred. The serious accident that occurred on 28 March 1979, at the Three Mile Island Nuclear Power Plant in the United States is the most serious accident yet at a nuclear power plant. The accident had caused many people to be concerned.

But investigation proved that none of the workers in the nuclear power plant was injured. The maximum dosage of radiation received by residents inside the surrounding 80-kilometer area is equivalent to the dosage from one x-ray examination. Therefore, it can be believed that as long as sufficient protective and safety measures are taken, the nuclear power station is a safe and clean energy source. Our province lacks coal and has less electricity. The extent of self-sufficiency in energy averages only about 20 percent. Quickly building a nuclear power station will be a very effective and important way to ease and solve the shortage of energy in our province and in eastern China.

What is a nuclear power station? What is its operating mechanism? How does it cause radioactive pollution in the environment? How can this be prevented? These are all questions that people are concerned about.

We know that the heavy atomic nucleus uranium-235 splits into two parts under neutron bombardment and at the same time releases a large amount of energy (one gram of uranium-235, when completely split, can release an amount of energy equivalent to the energy released by burning 2,700 kilograms of standard coal). As the uranium-235 atomic nucleus splits, it simultaneously releases two or three neutrons. These neutrons can cause other uranium-235 atomic nuclei to split. This continuous splitting of atomic nuclei is called a chain reaction.

If this reaction is not controlled, then within a very short time the massive amount of energy released by the violent chain reaction will cause a nuclear explosion. The atomic bomb is made according to this principle.

The structure of the reactor is different from that of an atomic bomb. An atomic bomb contains highly condensed uranium of more than 95 percent. The uranium-235 used in the reactor of a nuclear power station is a fuel of uranium dioxide of only 3 percent and there are control rods made of boron and cadmium to absorb neutrons and to slow down the energy released so that the chain reaction is controlled. Therefore, under all situations, the reactor will not explode like an atomic bomb. People use the heat released by nuclear fission to convert the water inside the heat exchanger into high-temperature, high-pressure steam to drive the steam turbine generator. Thie converts thermal energy into electrical energy. This is the fundamental operating principle of a nuclear power station.

The rapid development of nuclear power stations is related to the shortage of energy in the world mainly because of its own characteristics:

One is that the transportation of fuel is minimal. A nuclear power station with a 1 million-kilowatt pressurized water reactor requires adding 40 tons of nuclear fuel each year. Only one and a half tons of uranium-235 is used, and the remaining can be recovered. A thermal power station with the same capacity consumes over 2 million tons of coal each year, and the fuel has to be transported by an average of three 40-car trains each day.

The second is that the operation of a nuclear power station is reliable. The annual number of hours of utilization can reach an average of 6,000 hours with the highest reaching 8,000 hours.

The third is that the cost of generating electricity is low. Calculations for the first half of 1976 show that the cost of generating each kilowatt-hour of electricity by a power station fired by coal is equivalent to 3 fen 5 li renminbi, that required by a power station fired by oil is 7 fen, and the cost to generate electricity by a nuclear power station is the lowest, less than 3 fen, 18 percent cheaper than the power station fired by coal and 59 percent cheaper than the power station fired by oil.

When a nuclear power station is operating normally, it will produce "three radioactive wastes." In the waste gases released, the major contents are tritium, carbon-14, krypton-85 and xenon-133. The levels are not high. Generally they amount to several parts in 10,000 the allowable amount for release. The amount of radiation received by surrounding residents is sometimes even less than that produced by coal fired and oil fired power stations. The waste water is characterized by its large volume and low level of radioactivity, generally less than 1 percent of the background dosage in environmental water. The solid waste of nuclear power stations include waste ion exchange resin, filters, residue on evaporators, fragments of nuclear fuel components and discarded protective devices. As long as they are properly treated, pollution can be prevented.

Statistical data from the United States indicate that during normal operation, the dosage of radiation received by each resident from the "three wastes" produced by a nuclear power station is only three parts in 100,000 the amount of background radiation received by the human body from the environment, and less than 0.1 percent of the dosage the human body receives from radioactive fallout of nuclear tests. Therefore, relatively speaking, pollution of the environment by a nuclear power station is even less than others.

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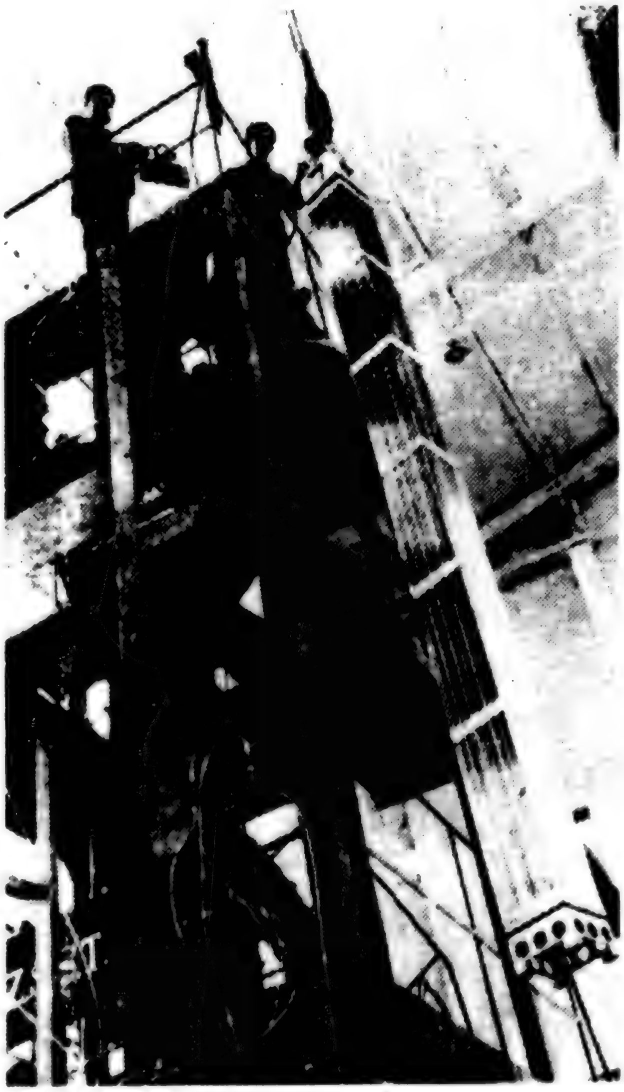
NUCLEAR POWER

WORK ACCELERATED ON CHINA'S FIRST NUCLEAR POWER PLANT

Beijing RENMIN RIBAO in Chinese 9 Feb 83 p 1

[Photograph and caption]



Personnel working on nuclear power plant's construction conducting water blockage tests on nuclear fuel elements.

CSO: 4013/125

ZHEJIANG EYES EXPLOITATION OF ALTERNATIVE ENERGY RESOURCES

Hangzhou ZHEJIANG RIBAO in Chinese 25 Oct 82 p 2

/Article by Chi Quanhua /6688 0356 5478/: "Bright Prospects for Developing Bioenergy and Water Power Resources; Concerned Specialists Believe That the Outlook for Resolving the Problem of Energy in Our Provincial Rural Areas Is Good and the Goals Are Clear; Problem Now Is 'Make the Blueprint a Reality'"/

/Text/ Energy is a major problem in further developing the rural economy in our province. What is the solution to the energy problem in our provincial rural areas? This has been a concern of provincial leaders involved and departments of scientific research on energy. This reporter recently attended province wide symposium on rural energy resources and heard the opinions of some specialists, thereby understanding that the prospects of developing and utilizing rural energy resources in our provincial rural areas are rather bright. The outlook is particularly good in the development and utilization of bioenergy and water power resources such as methane, small hydropower, bone coal and fuel forests.

Take the tea industry as an example. At present the amount of timber burned for making tea alone in our province is more than 600,000 cubic meters, equivalent to a whole year's purchase of timber by the whole province. Moreover, the tea season is also the wet season of high rainfall for electric power generation. Tea making requires electricity day and night and can fully utilize power when it is at low demand. This year, Xinchang County has 310 production brigades that use small hydropower to manufacture tea, which saves 810 metric tons of coal and over 4,000 dan of firewood. According to projections by specialists concerned, if electrified processing of tea is popularized throughout our provincial rural areas, about 170,000,000 kilowatt-hours of power in May and June will be needed. The existing small hydropower under 500 kilowatts will fully satisfy this need and the state will not have to make further investment on building power stations but merely increase some circuits and changing power adjustment. Again, in the case of methane, at first we only thought of using it for boiling water, cooking and lighting, but now the application of methane has rapidly grown in the realm of production such as tea manufacturing, dried noodle manufacturing, germination of seeds, generation of electricity and manufacturing of methane diesel engines. Therefore it is clear that the prospects of resolving the problem of energy resources in our provincial rural areas are still good.

In terms of actual conditions, our province is quite rich in bioenergy and water power resources and it is feasible to use them. In water power resources alone our province has a reserve of 6,000,000 kilowatts which can be developed for an installed capacity of 5,300,000 kilowatts. That which belongs to small hydropower can install 2,500,000 kilowatts but at present we have only developed one-fifth. When added with human and animal night soil, rice, wheat and maize stalks in the whole province, other than those used as feed, industrial raw materials or returned directly to the fields, will ferment in ordinary temperatures and can generate 5,200,000,000 cubic meters of methane whose heat is equivalent to 4,700,000 metric tons of raw coal. If this methane is equally divided among the peasants, it will be more than enough for cooking three meals a day. At present, however, there is on the average only one methane-generating pit for every 100 people in the countryside. A large amount of night soil is used directly on the fields and a great quantity of straw is directly burned, which is truly a pity.

In terms of technical conditions and economic benefits, utilization of bioenergy and water power resources require low investment, give quick results, can be used in a dispersed manner and on a small scale, and suit the present economic characteristics in the countryside. Peasant households only need to spend over 100 yuan to operate a methane-generating pit which can immediately generate the gas for use. Since generally 2,000 to 3,000 jin of firewood can be saved each year, in 2 to 3 years they can regain the capital. The rebuilding of firewood-saving stoves needs only 20 to 30 yuan each. Their use will save half the amount of firewood so that the masses say: "By converting an old stove to a new stove, a whole dan of firewood can be saved in 5 days." The cost of converting the stove can be regained in a few months. Although the invesmtent on small hydropower is higher, generally it can generate electricity within 2 years. The economic benefits are great and the time it takes to regain the investment is short.

Of course, much work has to be done if we mainly rely on bioenergy and water power resources:

Vigorous popularization of knowledge on rural energy conservation is an important link in resolving the problem of rural energy resources. At present rural energy consumption varies from place to place. For instance, in the electric power consumption for irrigation, generally each mu requires 40 to 50 kilowatt-hours but villages in Huzhou Municipality only need 20 kilowatt-hours. If the provincial average can be reduced to 25 kilowatt-hours, we will be saving 100,000,000 kilowatt-hours. Take firewood-saving stoves as another example, 1 jin of firewood can boil 10 jin of water, but some peasant households in mountainous areas can only boil 1 jin of water with 1 jin of firewood. Someone has calculated: the countryside now annually consumes 24,000,000,000 jin of firewood (excluding straw), but the heat efficiency rate of old stoves generally does not reach 15 percent. Based on the market price of 3 yuan for 1 dan of firewood, the chimney heat loss from peasant households is equivalent to more than 610,000,000 yuan. Some specialists in the province have made proposals on the problem of education in rural energy conservation and believe that concerned schools of higher learning ought to follow the spirit of the State Council documents by establishing a specialized field in bioenergy or

operating specialized courses on methane. They have also given concrete consideration to the goals of training, education system and planning of courses. Some comrades have proposed opening classes on energy conservation in rural areas and establishing specialized corporations (such as a methane technical service corporation) to train, evaluate, select and build specialized technical contingents. They feel that this is a good plan. At the same time, many specialists are concerned with conscientiously resolving the problem of the utilization of bone coal and with giving emphasis to research on solar, wind and tidal energy.

Strengthening organized leadership. At present departments concerned put strong emphasis on industrial energy usage, but no one manages the "important aspect" of energy usage in rural areas. The countryside accounts for 60.7 percent of the energy consumption in the province. For this reason, recently four organizations including the provincial energy research institute jointly proposed to concerned provincial departments that the provincial leadership group on energy resources and scientific associations carry out a provincewide and comprehensive survey on rural energy resources in order to make proposals on comprehensive treatment. They also proposed that the organs in charge do a good job in short, medium and long term plans for rural energy resources and put forward measures; that science and technical departments in charge organize all units to cooperate and tackle key problems; and that existing provincial research units on energy resources pool their strength to change the state of "everyone talks about rural energy resources, everyone gives concrete opinions, but no one has any authority to implement anything."

Besides, we must also promptly resolve some concrete policy problems in order to mobilize the enthusiasm of all departments and rural production teams. These include such policies as on the protection of natural resources, awards and penalties in the management of energy use, and economic and technical aid. Concerned specialists said: The outlook for resolving the problem of energy in our provincial rural areas is good and the goals are clear. The present problem is to "make the blueprint a reality" and conscientiously work according to the plan. Only if the leadership pay attention, the measures are effective and we promptly resolve some concrete policy problems, we believe that a new situation will appear in the development and utilization of energy resources in our provincial rural areas.

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CSO: 4013/75

SUPPLEMENTAL SOURCES

BIOGAS GENERATION MAY HELP EASE RURAL FUEL SHORTAGES

Guangzhou YANGCHENG WANBAO in Chinese 25 Nov 82 p 1

[Article by reporter Xu Huancheng [6079 5478 2052]: "Severe Fuel Shortage in Guangdong's Rural Areas: Development of Biogas Generation Is a Good Solution--Director of Provincial Biogas Institute Discusses Present and Future Construction for Biogas"]

[Text] Gu Hongchang [0657 1347 2490], director of the Guangdong Province Biogas Institute, told reporters yesterday that the rural fuel shortage is fairly serious in Guangdong at the present time, and that the solution to the rural energy problem is one of the most urgent matters before us today--a task which concerns the national economy and the people's livelihood.

Surveys show that over 7 million rural households in Guangdong are short of fuel: this is over 70 percent of rural households. The sources of energy are also not rational: 95 percent is derived from the burning of firewood and crop residue. Every year it is necessary to burn over 7 million m^3 of firewood and over 460 million dan of straw and stalks. Shortages of firewood and grasses in some areas have led to sharp rises in fuel prices: some people have denuded the mountain forests, causing soil erosion and upsetting the ecological balance. In order to save on fuel, the rural people of some areas cook their rice once a day for all three meals: this is not hygienic.

How can the rural energy shortage be solved? Gu Hongchang said that many years of investigation have shown that the development of biogas generation is a good solution. As early as 1929, he said, someone in Shantou began to study and make use of biogas. An advertisement appeared in SHANBAO on 26 March 1930 for a "newly invented gas lantern." The ruins of abandoned tanks can still be seen today. In 1959 the various regions "went in for biogas in a big way." Although a great deal of noise was made, both management and technology were inadequate: in many areas the effort collapsed without gaining any results, and the masses were left with a bad impression. After 1973, the various regions had learned from experience and one after another resumed biogas research and exploitation. By 1981 Guangdong Province had over 54,000 biogas digesters; 1,011 production teams used mainly biogas for cooking and illumination; and 21 biogas power generating stations had been built, with an installed capacity of 650,000 watts. The practice of many regions has shown that the use of biogas can save fuel, improve fertilizer

efficiency, and is beneficial for the environment and sanitation: a single program with many good results--the benefits are obvious.

Gu Hongchang pointed out that Guangdong has many advantages in the development of biogas. First, the climate is relatively warm: except for a few counties in north Guangdong, biogas can be generated all year round. Second, there are plenty of materials: surveys show that the 99 counties and municipalities of Guangdong have rich materials for biogas production. The average household has 580 m^3. Third, biogas technology is constantly improving: the rate of success in building biogas digesters is now over 95 percent. At present some regions are building low pressure tanks which are less costly and easier to control than high pressure tanks. Furthermore, there is an urgent demand from among the peasants. It is only necessary to guide action according to these circumstances and work hard, and Guangdong's construction for biogas generation will be successful.

Finally, Gu Hongchang also discussed some difficulties encountered in the development of biogas. Most important are inadequacies in organization and personnel. The biogas offices of the various regions are temporary departments: they are staffed with only one or two part-time personnel. Funds are also woefully inadequate, and have even been decreased over the years. Only 500,000 yuan are allocated to scientific research this year. There are also serious shortages of cement and other materials for building biogas digesters. Gu Hongchang asked this newspaper to summon the leaders at every level to pay attention to the rural energy problem.

12187
CSO: 4013/78

JIANGXIA TIDAL POWER STATION BRINGS ECONOMIC BENEFIT TO AREA

Hangzhou ZHEJIANG RIBAO in Chinese 1 Jan 83 p 1

[Article: "Jiangxia Tidal Power Station Has Produced More Than 2 Million Kilowatt-hours" For further details on this experimental power station, see JPRS 82086, CHINA REPORT/ECONOMIC AFFAIRS of 27 October 1982 No 276, pp 176-184.]

[Excerpts] As of the end of November 1982, the Jiangxia Experimental Tidal Power Station on Yueqing Bay, Wenling County, had generated 2,100,000 kilowatt-hours of electricity.

This electric power station began to produce electricity in May 1980. Plans call for the installation of six generators, each with an installed capacity of 500 kilowatts. The No 1 generator is now in operation and the others will be installed in succession.

Those in charge of the power station told this reporter that generating electricity with tidal power does not require the use of coal, does not occupy land, and does not pollute the environment. Instead, it reclaims land from the sea, promotes aquatic production and brings other socio-economic benefits. This power station sits on 5,600 mu of reclaimed land, with 4,700 mu planted in citrus, rice, and cotton, and the reservoir is being used experimentally as an oyster bed.

CSO: 4013/99

EXPERIMENTAL VILLAGE TO MAKE EXTENSIVE USE OF BIOGAS, SOLAR ENERGY

Hangzhou ZHEJIANG RIBAO in Chinese 21 Nov 82 p 1

[Article by Yang Xiyong [2799 1585 8673] and Wang Keqin [3769 0344]: "Accelerated Construction on Zhejiang's First New Energy Resource Village"]

[Text] In Fuyang County, Xinmim Commune, Chisong Brigade, construction has been accelerated on the first village in Zhejiang to use mainly new energy sources. This will be an experimental model village for Zhejiang, combining the development of such new energy sources as biogas and solar energy with the development of fuel forests and the application of firewood and coal saving technology.

This brigade is located near Jilong Mountain about 15 li northeast of the Fuyang county seat. It is a rather typical mountain village of the region south of the lower Chang Jiang, with 360 households and over 1,600 people. There is a lack of coal and oil, so the village depends on firewood and crop residues for energy. In 1980 the entire brigade consumed an average of 2,350 catties of firewood and crop residues per capita, or altogether 3.89 million catties of firewood. In order to bring about a change, the concerned departments of the provincial science commission and the county--following the general principles for rural energy construction of "suiting the measures to local conditions; exploring many paths; letting efforts complement each other; paying attention to actual results"--began by giving this brigade concrete assistance with hillside afforestation: the entire area has been greened. At the same time they worked hard on biogas and enthusiastically opened up new energy sources. Furthermore, they energetically promoted firewood saving stoves which save on firewood consumption. After a year of hard work, the brigade had fulfilled its plan to afforest 80 mu of hillside and nurture 800 mu of mao bamboo. Over 7,000 trees were planted all around. At the same time, the contingent for managing hillside forests was reorganized, and hillsides were closed off to facilitate afforestation. The entire brigade built over 250 biogas digesters: 210 are already producing biogas. Over 270 commune households are using stoves of a new technological design to save firewood: the furnace-core water-tank stove. It is estimated that the entire brigade will consume 1.4 million fewer catties of fuel than it consumed in 1980.

At present the concerned departments are assisting the brigade in summing up its experience and fighting to ensure that by the end of 1982 every commune member in the brigade will be using biogas or firewood saving stoves. Work will begin in 1983 to develop solar energy and complete work on this village as a multi-energy resource experimental unit.

12187
CSO: 4013/78

QUADRUPLING ENERGY OUTPUT BY 2000 'IMPOSSIBLE;' CONSERVATION POTENTIAL 'GREAT'

HK311434 Beijing RENMIN RIBAO in Chinese 21 Jan 83 p 5

[Article by Xu Shoubo [1776 1108 3134] and Wu Jiapei [3527 1367 1014]: "Strengthen the Development of Energy Resources and Vigorously Conserve Energy"]

[Text] [Abstract] It will be impossible to quadruple the out put of energy by the end of this century, So, in order to solve the energy problem, two approaches should be followed: development and conservation. The exploitation of China's energy resources ranks fourth in the world, but their utilization results are very backward; thus, the potential for conserving energy is very great. The development of energy resources should follow a new path of "extensive exploitation of resources," which includes rational exploitation of various kinds of energy resources, rational adoption of different kinds of exploitation techniques, and so on. The consevation of energy should follow a new path of "conserving energy in a broad sense." The essence of "conserving energy in a broad sense" is to obtain energy resources from technology, management, and from the readjustment and reform of the national economy.

The report at the party's 12th Congress put forward a correct policy to solve the problem of energy resources: strengthen the development of energy resources and vigorously conserve energy. How to implement this policy well is an important task placed before us.

Two Ways To Solve the Problem of Energy Resources

Development and conservation are two ways to solve the problem of energy resources. The proper handling of the proportion between these two is a very important question. We think that it will be easier to expound on this question if we use the following two terms: the coefficient of the increase

of energy exploitation and the coefficient of the increase of energy consumption (in considering the ratio between the speed of energy exploitation or of the increase in consumption and the speed of economic development, if we do not take into account the import, export and storage of energy, then the coefficient of the increase of energy exploitation would be the same as the coefficient of the increase of energy consumption). According to basic analysis, there are three possibilities: the first is that the speed of economic development depends entirely on the exploitation of energy. In that case, the coefficient of the increase of energy consumption is equal to 1 or greater than 1. The second case is that the speed of economic development depends both on exploitation and on conservation. In that case, the coefficient of the increase of energy consumption is smaller than 1 and greater than zero. When it is above 0.5, exploitation will play the major part; when it is below 0.5, conservation will play the major part; and when it is equal to 0.5, exploitation and conservation will be on the same scale of importance. The third case is that the speed of economic development depends entirely on conservation. In that case, the coefficient of the increase of energy consumption is equal to zero or smaller than zero. Therefore, the proper handling of the ratio between exploitation and conservation amounts to the scientific prediction of the coefficient of the increase of energy exploitation or consumption. From the point of the history of energy development of various countries in the world, the coefficient of increase of energy consumption has always been greater than 1; it has been so for a very long period, especially during the initial stages of industrialization. In other words, the speed of economic development depends entirely on exploitation. For scores of years, the coefficient of increase of energy consumption in the industrially developed countries has decreased somewhat, but it is still equal to 1 or so. And the solution of the energy problem in a developing economy still resorts to exploitation in the main. We have been following the same path since liberation, and the coefficient of increase of energy consumption has been greater than 1. Therefore, with the development of the economy, the amount of energy exploitation and consumption has become greater and greater. Thus, a series of problems have arisen such as serious environmental pollution in the cities, a tense transportation situation with regard to energy, overexploitation of petroleum resources, the destruction of forest vegetation, squandering of great quantities of energy, and so on and so forth. The party's 12th Congress proposed that by the end of this century the total yearly output value of industry and agriculture should be quadrupled. If the same old path were followed and the coefficient of increase of energy consumption were equal to 1, then the output of energy should also be quadrupled, which would mean an increase from a little over 600 million tons of standard coal in 1980 to over 2.4 billion tons in the year 2000, a yearly average increase of about 100 million tons. Obviously, this output goal cannot be achieved. Even if it could be achieved, problems such as transportation, pollution and others would not be solved. Therefore, from now on the solution of the energy problem should not follow the path of exploitation alone, and should follow both exploitation and conservation at the same time, which means that the coefficient of increase of energy consumption should be smaller than 1. Of course, the practice of economy should be based on the

prerequisite of exploitation, but it has many advantages over exploitation: 1) it does not need to recover energy resources from nature and is a kind of "exploitation" protecting resources; 2) it does not need the construction of facilities such as coal mines, oilfields, powerplants and energy transportation facilities, which means that it is a kind of "exploitation" with little investment; 3) its cycle is much shorter than exploitation. Exploitation usually requires 10 years to obtain results. But some measures of saving energy, such as strengthening energy management, can obtain instant results, and even large-scale energy-saving projects need only a few years to get results; 4) it would not give rise to or increase pollution; and 5) it is a kind of energy resource which can be "produced" by the people of the whole country. If everyone in the enterprises, units and families can be fully mobilized to do the work, starting from the small things, then the results will certainly be an enormous force in the "exploitation" of energy resources. In short, it is of strategic significance to place the conservation of energy in a preferential position.

Someone may very well ask that since saving energy has so many advantages, could it be possible for the total yearly output of industry and agriculture to quadruple by means of energy savings alone? It is absolutely possible within a relatively short period to develop the economy under the circumstances that the energy consumption rate does not rise or even decreases. But, from a long-term point of view, it is unrealistic to achieve this through complete dependence on saving energy.

As is well-known, the exploitation of energy resources in our country is rather advanced and our energy output ranks the fourth in the world. However, the utilization of our energy resources is very backward. Therefore, the potential for saving energy in our country is very great. According to the results of three methods of forecast, the total potential for saving energy in our country amounts to at least 55 to 57 percent. If all this potential is utilized, 55 to 57 percent of the energy resources needed in the economic development for the next 20 years would be obtained, and it is enough for exploitation of energy to take up the remaining 43 to 45 percent. To be on the safe side, it may be envisaged that the future problem of energy resources can be resolved half by conservation and half by exploitation. There is every possibility to attain this objective. From now on, we should strengthen the development of energy resources, but we should not expect too quick a step in doing the job. Excessive speed is neither economical nor practical. Besides, it is harmful to the efforts being exerted to change the grave situation of the squandering of energy in our country.

Strive to Embark on a New Path of Energy Exploitation

In the coming 20 years, solution to about half of the energy problems in our country will depend on exploitation and increased production. That is to say, the output of primary energy resources should be doubled, a yearly average increase of 3.6 percent and a yearly absolute increase of 30 million tons. Statistics show that from the beginning of the first 5-year plan to

1980, the primary energy resources of our country showed a yearly average of 9.6 percent, and a yearly average increase of 21 million tons in terms of absolute value, while in the 1970's the yearly average increase was 10.7 percent, and the absolute increase value was 40 million tons. Therefore, a yearly average increase of 3.6 percent comparatively is not a very high figure. But it is not an easy task because it requires a yearly increase of 30 million tons of standard coal which is equivalent to 42 million tons of raw coal, nearly twice the output currently attained by the Datong Mining Bureau.

In order to complete this difficult task, we must follow a new path of "extensive exploitation" that is Chinese in nature. This does not mean the exclusion of the "exploitation" paths adopted by foreign countries, such as the improved washing of coal, raising the quality of commodity coal, vigorously developing hydroelectric power and so on. The path of what we call "extensive exploitation" consists of the following six aspects.

1. Rationally develop various kinds of energy resources. Our country has a vast expanse of territory with abundant and varied energy resources. The reserve of coal resources ranks third in the world and water resources are among the world's front rank. But the rate of exploitation and utilization of these two big resources is very low, with only 3 percent for water resources and 10 to 20 percent for coal resources. Therefore, they are the key items for our future development, and investment should be centered on their construction. On the other hand, the present degree of exploitation for petroleum and natural gas resources has been too high. From now on, development should be steady and sure on the basis of increased storage, and the rate of recovery should be raised. Special attention should be paid to the prospecting and exploitation of sea oilfields. Biological fuel, including stalks and fuel forests, is the main source of fuel in our rural areas and those items should be rationally cultivated, cut and utilized. As for nuclear power stations, they are not expected to develop quickly in the immediate future because of a lack of sufficient conditions in many respects. Still, it should be developed gradually, with moderate speed. As for wind power and solar energy, they should be developed with due reference to the concrete conditions in different areas. Other items such as oil shale, gangue, city garbage and organic liquid waste should be rationally exploited. A comprehensive system of energy exploitation should be formed throughout the country, so that every kind of energy resources in different places throughout the country can be rationally and adequately developed and utilized.

2. Rationally adopt various kinds of exploitation technology. For some time in the past, the most advanced exploitation technology of foreign countries were eagerly sought after onesidedly, without due regard to the concrete conditions of our country and objective economic results, so that economic losses were experienced. Comprehensive mechanization of coal mining is a modern coal mining technique, but it can only be used in large-scale pits of large coal mines. It also involves large investment and high operating

costs, and is thus not suitable for extensive [illegible]. The conventional mechanized and semimechanized coal mining techniques may not be very sophisticated, but they are suitable for use in the majority of coal pits and their economic results are rather high. Therefore, they are especially suited for use in medium- and small-sized coal pits where both capital and technical forces are insufficient.

3. Rationally develop different scales of energy production. Of all the existing scales of energy production, the large ones are small in number and the majority of them are medium and small ones. Some people think that medium and small scales are not as economical as the large ones. This is generally true as far as energy processing enterprises (such as coal washing facilities, powerplants and oil refineries) are concerned, but it is not necessarily so for those enterprises engaged in developing primary energy resources where the extent of development depends on the actual amount of the storage of energy resources. Our country has various scales of energy resources. With regard to those large-scale coal mines, oilfields and large rivers, it is naturally improper to operate them on medium and small scales. However, neither is it proper to conduct large operations when only medium- and small-scaled energy resources are available. Therefore, the scale of energy exploitation should not adhere to only one form, and the actual scales should be developed according to different conditions in a variety of forms.

4. Give full play to the initiative in developing energy resources at all levels. In the past, the exploitation of energy resources mainly depended on state investment in the form of mines managed by the state. In recent years, the initiative of regional and commune-brigade units in developing energy resources has gradually been mobilized and various forms of joint operations have emerged. This kind of initiative plays a great role in speeding up the development of energy resources. In the past, because the price of coal was low and the relevant economic policy was lacking, some regional coal mines suffered great losses and subsequently closed down, with the result that many units of various regions with coal resources were unwilling to operate. Now that a more rational economic policy is being implemented, the initiative of the regional and commune-brigade units is quickly being mobilized. Therefore, it is very necessary to adopt a rational economic policy so as to give impetus to units of various regions and rural districts in their operation of mines.

5. Rationally solve problems of variety, quality and supply. For a long time, because of the tense supply situation of energy, variety and quality have not been of primary concern to the production units. Take coal for example. In the past, a great quantity of raw coal did not go through the process of screening, washing or other means of processing, with the result that varieties were very limited and quality was poor. The monotype and unsuitability of coal affected the efficiency of the kilns and exerted an evil effect on production. Because the quality of coal was poor, with too much ash content and gangue, the workload of the transportation units was greatly increased. Only when the variety and quality of coal are increased, the quality of services is enhanced, and supply and marketing are well

coordinated to the satisfaction of consumers, can the supplying of coal become lively and brisk and the economic results of the coal departments be greatly increased.

6. Continuously raise economic results in developing energy resources. The exploitation of energy resources requires a great amount of capital. The poorer the conditions of energy resources, the more capital required. Since the founding of the people's republic, because the conditions of the coal mines, oilfields and water resources, the eastern coastal regions are rather good, the development work of most of the regions has been conducted well. Therefore, from this day onwards, more emphasis should be laid on the western regions. The situation of exploitation in the western regions is rather poor, and unit investments, costs and expenses are expected to rise, thus, special attention should be paid to the economic results. The above-listed five aspects cannot be separated from the problem of economic results. For example, the ratio between various types of energy resources; the ratio between the advanced, the average and backward techniques; the ratio between large, medium and small operations; the ratio between mines run by the state, the regions and the commune-brigades; and the ratio between various specifications of coal, all should be fixed according to the principle of obtaining the best economic results. That is why we always add the word "rational" when we mention the details of extensive exploitation.

Vigorously Open Up a New Phase in Saving Energy Resources

Many years have elapsed since we began our work of saving energy resources, but we have always felt that the job is poorly done. When we mention conservation of energy, we usually think of raising the rate of energy utilization, saving coal, oil and electricity. As a matter of fact, what we went through in the past was exactly the path pursued by the industrially developed countries in their efforts to conserve energy. Conservation of energy consists of conserving energy in both a narrow and a broad sense. Increasing efficiency is a kind of conserving energy in a narrow sense, or direct conservation of energy. Extensive conservation of energy is, apart from direct conservation of energy, a kind of complete conservation of energy which includes all forms of indirect conservation, such as the saving of manpower, materials and financial resources, natural resources and the raising of economic results. Extensive conservation of energy is a new path, the special feature of which is to combine direct conservation with indirect conservation, and to combine the conservation of energy with the raising of economic results. The fundamental objective of extensive conservation of energy is to obtain the maximum economic results with a limited amount of energy resources. Practice in the last 3 years has proved that in the coming days our conservation of energy resources should follow this new path of "extensive conservation of energy," and only in this way can we open up a new phase in conserving energy resources.

What we call the new path of extensive conservation of energy consists of the following 10 aspects:

1. Rationally raise the efficiency of the systems of energy resources. Most of our energy equipment has rather low efficiency, the use of energy resources is irrational and management is backward. Because of all this, the efficiency of the systems of energy resources is very low. According to our estimates, with regard to all the commodities of our country in 1978, the efficiency of energy systems was approximately 32 percent, while the efficiency in advanced countries was approximately 40 to 50 percent. If the efficiency of our energy systems can be raised by 0.5 percent annually, 10 million tons of standard coal can be saved per year.

2. Rationally save various kinds of daily consumer goods and materials. The energy resources used in our material production amount to 60 percent of the total energy consumption in our country. Of this percentage, the energy resources used in producing daily consumer goods and materials is 50 percent. Owing to the relative backwardness of machinery equipment, technical operation and level of management, the utilization rate of these goods and materials normally reaches only 20 to 60 percent. For example, the utilization rate of our steel in 1978 was 65.8 percent. If it can be raised to 80 percent, 2.5 million tons of steel can be saved, which amounts to 12.5 million tons of energy resources. Take chemical fertilizer as another example. Its utilization rate stands at only about 30 percent. If this rate can be doubled, up to 10 million tons of chemical fertilizer can be saved, which amounts to saving a great quantity of energy resources. Furthermore, the utilization rate of other materials also is not high. The potential of energy saving is really very great.

3. Rationally save the unnecessary volume of service work. Communications and transportation departments are the main service work departments in our country. Their energy consumption amounts to 7 percent of the total consumption in our country. Because some of our economic deployment is irrational, the planning and control of transportation is irrational, and the consumption rating of many materials tends to be excessive, there exists a certain amount of unnecessary transportation service volume. If the overall work can be improved in the future, a great deal of service work and, therefore, a great quantity of energy resources, will be saved.

4. Rationally save manpower and reduce the growth rate of the population. At present, our commodity energy resources for civil use (that used by families) amounts to over 50 million tons, which is increased to 320 million tons if the noncommodity energy resources are included, for an average per capita direct consumption of energy of more than 0.3 tons per year. It is obvious that a reduction in the growth rate of the population can greatly save energy resources.

5. Rationally save the amount of capital used. The use of capital is in effect the use of various kinds of materials. The more the materials used, the more materials the state is bound to produce and the more the energy

resources have to be consumed. According to our estimates, the amount of capital used in our country's state-run industries and enterprises is over 140 billion yuan more than the amount used in the year where the best performance in the use of capital was recorded. Here also lies a great potential in saving energy.

6. Rationally save in other kinds of energy-consuming areas, such as national defense, land utilization, and so forth.

7. Rationally raise the output of units and enterprises (equipment) and results of service work. As we know, energy consumption of products manufacturing and service work will decrease with an increase in output and results of service work (such as the volume of transportation cycles). Take Jiefang brand trucks as an example. Compared with half-load trucks, full-load trucks will save 40 percent in gasoline. There is a great potential for conserving energy in this respect.

8. Rationally raise the quality of various kinds of products and service work. With the same amount of energy used, if the quality of products is poor or even of rejection quality, then energy will be wasted. A great amount of energy resources will be saved if we can reduce the proportion of rejects or damaged goods and raise the proportion of up-to-standard products.

9. Rationally lower costs and expenses. According to our estimates, if production costs and expenses in our country can reach the best level recorded so far, 10 percent of these figures can be reduced, resulting in a net income of 24 billion yuan, which is equivalent to a savings of 100 million tons of standard coal. Therefore, we cannot afford to use precious energy resources in those enterprises which operate at very high costs but with a very limited amount of income.

10. Rationally alter the economic structure and the orientation of product manufacturing and service work. Take, for example, energy consumption in terms of net output value. The ratio of energy consumption for heavy industry, light industry and agriculture is approximately 13 : 4 : 1. Therefore, it is very important to rationally readjust the ratio between these three sectors.

We can see from the above that the potential for extensive conservation of energy in our country is really very great. Based on initial estimates, our current energy consumption amounts to over 600 million tons, and extensive conservation of energy has a potential of more than 300 million tons, among which the potential for direct conservation constitutes one-third and that of indirect conservation constitutes two-thirds. Extensive conservation of energy means acquiring energy from improved technology and management, and from the readjustment and restructuring of the national economy. It is entirely possible to lower energy consumption by 50 percent by the end of this century if strenuous efforts are made to develop the work of conserving energy in a broad sense.

CSO: 4013/119

EDITORIAL REITERATES KEY ROLE OF CONSERVATION IN OVERALL STRATEGIC POLICY

Kunming YUNNAN RIBAO in Chinese 31 Oct 82 p 1

[Text] Energy conservation is an important way to put into effect the strategic policies of the 12th Party congress. In launching the fourth national energy conservation month activities, we must make energy conservation take root in the hearts of the people and insure successful results.

Yunnan's situation of "abundant coal and electricity" that appeared during the early period of readjustment is now a thing of the past. This year, there has been a gap in the supply and demand for coal and electricity and on top of that, a drought has made it impossible to further develop hydroelectricity creating an even greater shortage of electric power. By the third quarter of the year, we were forced to reduce electricity. Less hydropower means more thermal power and we have already used in excess of several hundred thousand tons of raw coal; there is a critical shortage of coal to generate power. In the period of the Sixth Five-year Plan, Yunnan has no new major energy projects going into operation, but it does have some newly built factories and mines in urgent need of an energy supply. Because of this, the energy shortage is not only a glaring problem today, it will be a weak link for some time to come. The way to alleviate the present contradiction of energy supply and demand is in conserving energy. We should deeply study the documents of the 12th Party Congress and go a step further in making clear the position of energy conservation in the growth of the national economy, firmly establish thinking for long-term energy conservation, and derive benefit from it. Today, Yunnan consumes a high level of energy and thus the potential for saving energy is great. In the first half of this year, Yunnan's average energy consumption was 12.9 percent higher than the national average. If it drops to the national average, we will be able to conserve 760,000 tons of standard coal each year. This corresponds to having added a 370,000-kilowatt power station. There is more to reducing energy consumption and conserving energy than meets the eye. In the energy conservation month activities we must take aim at the key links and weak links of energy consumption, and carefully and thoroughly resolve a lot of problems. The more energy resources are in short supply, the more we must adhere to the principle of "lay good groundwork when planning energy use." Put limited energy resources to the best use. Do not exceed planned energy allotments and repay that [amount] used in excess; do not add to this year's quotas. During enterprise rectification, consolidate and strengthen energy conservation management. Establish a sound energy

conservation organization. Improve meters and do good basic work. Fully resolve the problems of "testing without methods, consuming without quotas, and systems that are imperfect." Stop waste and leaks in the production process. We must make a sharp distinction between energy usage for production and daily life. Have separate business accounting, and electrical and water meters. Switch over from a guaranteed consumption system to a metered system. This work must be basically completed within a year. If it exceeds this time limit, fees will increase. We must concentrate on the upgrading of obsolete equipment that consumes high levels of energy and energetically publicize effective and advanced technical experience for energy conservation. Having dealt with these issues, we can alleviate the contradiction of supply and demand of our province's energy resources and ensure a fixed rate of growth for industrial and agricultural production, gaining even more economic benefits.

12269
CSO: 4013/73

ZHEJIANG ENERGY CONSERVATION RESULTS IN HIGHER INDUSTRIAL OUTPUT VALUE

Hangzhou ZHEJIANG RIBAO in Chinese 30 Oct 82 p 1

/Article: "State Economic Commission and Provincial Government Individually Convene Telephone Conferences: Mobilize to Launch the Fourth 'Energy Conservation Month' Movement"/

/Text/ The State Economic Commission called a telephone conference today and demanded staff workers throughout the country treat the fourth "energy conservation month" movement to be launched in November as an important measure to implement the strategic policies of the 12th Party Congress and make a major advance in energy conservation work.

State Council member Bo Yibo /5631 0001 3134/ spoke at the telephone conference. He said: Good results have been made in launching the "energy conservation month" movement in the past few years and it seems to be a good measure. This is the year when the first "energy conservation month" is held after the 12th Party Congress and its significance is different from past years. Active conservation of energy is an important safeguard to the realization of tripling the total industrial and agricultural output value. Every cadre and staff worker must firmly foster this viewpoint: The realization of the necessary energy for the goal of "quadrupling" half depends on both exploitation and conservation.

Bo Yibo emphatically pointed out that other than strengthening management, energy conservation must stress the key point of technical transformation and technical progress. Without advance equipment energy consumption cannot possibly have a significant reduction. We must therefore strongly emphasize scientific research, design and manufacturing of energy conservation equipment, organize the strength of these three areas and strive for a breakthrough within two or three years.

Deputy Director Yuan Baohua /5913 1405 5478/ of the State Economic Commission also spoke and put forth the following demands on launching the fourth "energy conservation month" movement: (1) We must mobilize the masses to become more involved in studying the 12th Party Congress documents, further understand the role of energy conservation in the growth of the national economy, firmly foster the strategic mentality of long-term conservation of energy and lay a good ideological foundation for energy conservation work. (2) We must launch

the "five inspection" movement in earnest, that is, inspect the implementation of directives on energy conservation, the implementation of energy conservation measures, the completion of this year's energy conservation plans, the building and perfecting of energy conservation organs, and the carrying out of management and fundamental work in energy conservation in enterprises. We must be able to inspect while we rectify and reform, conscientiously do well in scientific management of energy conservation, close up various loopholes, remove the phenomenon of waste and increase energy utilization rate. (3) We must earnestly do a good job in summarizing, making appraisal through comparison and giving commendations. (4) On the basis of the "energy conservation month" movement, we must formulate the energy conservation plan for next year, define energy conservation goals and implement energy conservation measures so that there will be a new improvement in energy conservation work next year.

This November is the fourth energy conservation month since the State Council decided to launch the "energy conservation month" movement. On the night of the 28th, the provincial people's government drew up a plan in a telephone conference on the "energy conservation month" movement launched in our province and on future energy conservation work.

Zhang Zhaowan /1728 0340 5502/, vice governor and leader of the energy resource group, spoke on behalf of the provincial people's government. He said: Since the beginning of this year gratifying results have been further achieved in energy conservation work in our province. The increase in energy consumption is definitely lower than the increase in agricultural output value. Between January and September this year, industrial output increased by 8.2 percent over the same period last year while energy supplies increased by only 3.2 percent. Half of the increase in industrial output value in these few years has been achieved by energy conservation. A large number of advanced energy conservation units mushroomed among the Hangzhou Steelworks, Tongxiang Chemical Fertilizer Plant, Huafeng Paper Mill, Zhejiang No. 1 Silk Mill and Shaoxing Dongfeng Brewery. Units that started out slower in Jiaxing Municipality, the Hangzhou Glass Plant and Hangzhou Xinhua Silk Mill, have undergone a great transformation.

Comrade Zhang Zhaowan pointed out that before there is any significant improvement in the production and supply of energy, energy will tend to be in short supply for a rather long period of time. All localities must adhere to the guiding ideology centering around energy conservation and stress these four tasks: (1) Establish and perfect administrative organs for energy resources. Prefectures, municipalities and counties which have not yet established a centralized administrative organ for energy resources must do so by the end of the year. Work must be carried through organizationally and placed under someone's charge. (2) Rational readjustment of the structure of products and enterprises. Products that require a high energy consumption must be produced according to plans handed down by the provincial government, and we must actively develop products of high beneficial result and low energy consumption. (3) Actively develop the technical transformation of energy conservation. The present emphasis of technical transformation of energy conservation should be placed on boilers, industrial kilns and other popular equipment that are of low cost and can bring quick, effective and tangible

results in energy conservation. For energy conservation measures which have already been arranged, we must establish the job responsibility system so that this will promptly play the beneficial role. (4) Further emphasize the management of energy resources, and in particilar strengthen the management of fixed energy quotas, make the system of assessment severe and implement measures of awards and penalties. Stress measurement of energy resources, promptly and fully provide measurement tools, instruments and meters. Do a good job in management of equipment, stop evaporation, oozing, dripping and leaking, carry out training in energy conservation techniques and raise the operational and technical levels.

Comrade Zhang Zhaowan demanded that all units in the "energy conservation month" movement give wide publicity to the importance of energy conservation work, do well in the inspection of energy conservation work, sum up the experience in energy conservation, commend the advance and take measures such as imposing higher charges, restricting energy supply, requiring readjustment or halting production for readjustment within specified time against individual enterprises which have exceeded their energy consumption or wasted energy for a long period of time but have not earnestly rectified and reformed themselves. He also demanded all localities to make adequate plans for present energy supply in order to prepare for next year's production.

Persons in charge of prefectural, municipal and county government, concerned departments, and persons in charge of key enterprises listened to the substance of the conference locally.

9586
CSO: 4013/75

ENERGY CONSERVATION FIGURES HEAVILY IN YUNNAN'S PLANS FOR GROWTH

Kunming YUNNAN RIBAO in Chinese 12 Nov 82 pp 1, 2

[Article: "An Pingsheng Talks at the Fifth Plenary Session of the Third Provincial CPC Committee Conference on Guiding Ideology and General and Specific Policies for Developing Industries"]

[Excerpts] During the Fifth Plenary Session (enlarged) of the Third Provincial CPC Committee Conference, Comrade An Pingsheng discussed in detail the guiding ideology, the general and specific policies, and the importance of developing industry, energy resources, communications, capital construction, city and town collective economies, and the commune and brigade enterprises of Yunnan Province.

Comrade An Pingsheng emphasized the need to strengthen energy resources and communications construction. He said our province is rich in hydraulic power and coal resources, but because of previous neglect of the construction of basic energy facilities, the production of energy is unable to meet requirements. Moreover, Yunnan's many heavy industries consume a significant amount of energy and, among the heavy industries, the relatively few manufacturing industries use a comparatively large amount of energy and these industries are rather small. Along with the resurgence of heavy industry, the overall development of industry and agriculture means even more acute shortages of energy resources and this forces us into an inactive position.

The policy for resolving the problems of energy resources is to lay equal stress on exploitation and conservation. First, we must accelerate the remaking of the Puping Village Thermal Power Plant and the building of the Longtan Thermal Power Plant, increasing the power generating capacity of these two projects. These are key projects for solving the later stage of the "Sixth Five-Year Plan" and the early stage of the "Seventh Five-Year Plan." We must rework and rethink the final work and potential of existing coal and power production enterprises. At the same time, we must intensify work on the initial stages of the Manwan Hydroelectric Power Station and energy exploration work. We must "not wait until we are thirsty to dig a well" again. Second, we must support the coal industry with economic policies and encourage prefectures, counties, communes and brigades to actively manage coal, water, and electricity. Third, earnestly carry out each energy conservation measure and use every possible means to conserve energy. Improve the methods of energy supplies, carry out centralized distribution, the rationing of supplies and the policy of being responsible for a task until it is complete. In particular, we must

energetically make technical improvements and equipment renovation our energy conservation goals and take firm steps to eliminate old equipment that consume unduly large amounts of energy. We must make appropriate revisions in the structure of industry, making it able to perform in a superior way that is advantageous for energy conservation--getting the optimum comprehensive economic benefits. Fourth, we must resolve the glaring energy problems in rural areas. We must promote the burning of coal, the development of fuel forests, the handling of methane-generating pits, utilization of solar energy, and the exploitation of various other energy sources.

12269
CSO: 4013/73

YUNNAN'S PARTICIPATION IN NATIONAL 'ENERGY CONSERVATION MONTH' OUTLINED

Kunming YUNNAN RIBAO in Chinese 31 Oct 82 p 1

[Text] The Provincial (CPC) Economic Committee recently sent out a circular requiring each locality and department to implement earnestly the spirit of the nationwide energy conservation month telephone conference and to organize the launching of this year's energy conservation month activities using every possible means to save energy and thereby increase [economic] benefits. The circular pointed out that in recent years Yunnan has done a number of things to conserve energy and has received considerable results. Compared to 1980, the 1981 energy resource consumption was reduced 0.8 percent and industrial production was increased 8.1 percent. The amount of standard coal needed to produce a value of industrial output of 100 million yuan dropped from 83,000 tons to 76,000 tons, a reduction of 8.4 percent or a reduced use and conservation of 550,000 tons (overall). In the first half of this year, industrial production increased 16.2 percent but energy consumption increased only 8.4 percent. The energy required for a 100 million yuan value of output was reduced 6.2 percent. However, at the present time, many enterprises consume a large amount of energy resources which is a great waste. In twenty-three categories they came within the quota, but in the first half of this year, there were 22 categories that were over the national average. Thus, the potential for saving energy is very great.

In recent years the supply-demand contradiction of Yunnan's energy resources has been increasingly obvious, and now it has turned into shortages. Even if a great many measures to broaden sources of income and reduce expenditures were adopted in every area, the gap between supply and demand would still be very large. The insufficiency of energy supplies restricts Yunnan's development of the industry and agriculture. The circular requires that while conscientiously dealing with coal and electricity production, we must earnestly deal with energy conservation, deepen our understanding, strengthen our leadership, carry out the measures, and concentrate on results.

Regarding this year's energy conservation month activities, the Provincial (CPC) Economic Committee has made concrete plans and arrangements. The emphasis is on monitoring the progress of energy conservation work and is directed against weak links and on studies to improve methods. They specifically demand that the "five check-ups" be done well: checking up on the establishment of energy conservation methods, plans, instructions, and organizations and on the implementation and progress of conservation management and basic work.

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CONSERVATION

BRIEFS

EAST CHINA GRID SAVES COAL--Eastern China's use of coal to generate electricity is being reduced year by year. In 1982, coal consumption for each kilowatt-hour of electricity generated was 408 grams, 4 grams less than in 1981. In the period 1980 to 1982, the East China Grid conserved a total of 820,000 tons of standard coal, enough coal to generate almost 2 billion kilowatt-hours of electricity. [Excerpt] [Beijing BEIJING RIBAO in Chinese 7 Jan 82 p 4]

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